SIEMENS

MAMMOMAT Novation DR

SP

Software

System

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Description of the syntax used in these instructions

<.....>	The function keys to be pressed are indicated between these characters, for example <ENTER>, <ESC>, etc.
CAPITALS	Capital letters indicate data which must be entered unchanged, for example the name of a register, file, etc.
Italics	Italics indicate data in which a value should be entered, e.g. for user name, the name of the technician should be entered.
[.....]	Square brackets enclose optional additions to commands.
Bold	Data relating to formats, user entries, etc., which is important for the following entry, is shown in bold on the screen.
_____	This character indicates that the space bar must be pressed.
xx yy zz	Data can be entered in place of "x, y, z" (e.g. date).
...}	Curved brackets indicate that one term must be selected from a list of several terms.
NOTE	Important remarks are indicated in this box.
*****	When the password is entered, only these characters are shown.
<ENTER>	Every entry must be confirmed with the <ENTER> key.
<ESC>	ESC allows paging back through the program.
<xx> + <y>	Some functions are selected by pressing two keys simultaneously. Procedure: For example, press and hold the <Shift> key, press the <*> key, and then release both keys.
<F1>	Key <F1> calls up a selective help text.
<F10>	Key <F10> exits the program.
PLD	Programmable Logic Device on the AEC board (D701).
Flash	Memory device on the AEC board (D701).
OS	Operating system, e.g. "Microsoft® Windows®"
BIOS	Basic Input and Output System, a program stored in the computer hardware which launches start-up functions when the computer is started.

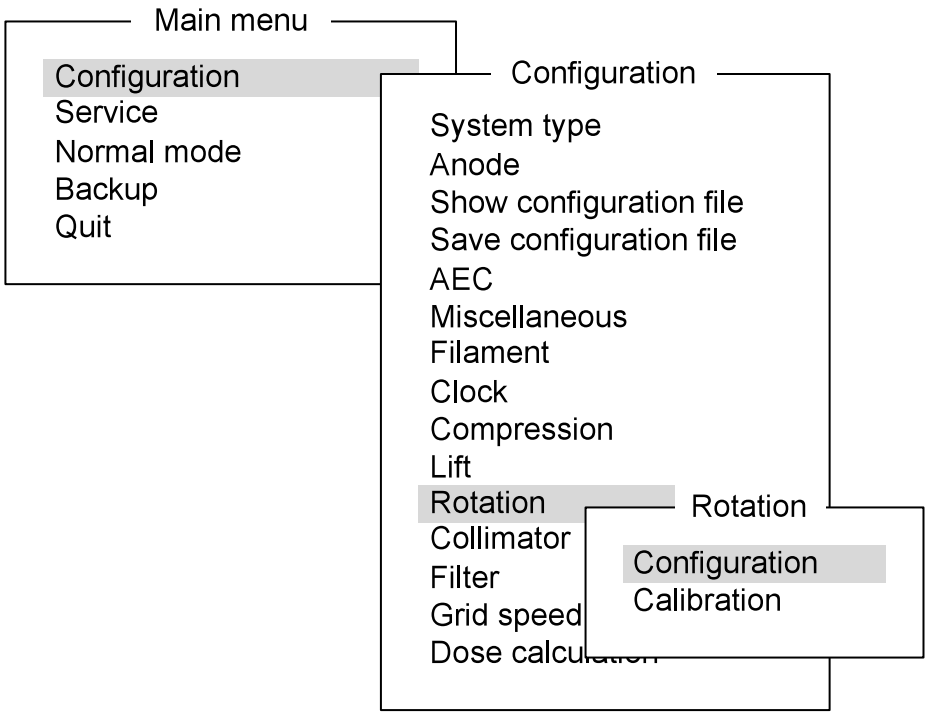

Fig. 1: Menu selection

Menu selection	This shows where a particular subroutine can be found. For example:
XXX=>XXX=> **XXX=>XXX**	**Main menu => Configuration => Rotation => Configuration**
	When several menus, programs, files, etc. are presented for selection, they are shown in the main menu => xxx => xxx. Selection is made via the <↓> and <⇑> keys. The selected module is highlighted, see (Fig. 1 / p. 6)

Connecting the service PC

The service PC being used must meet the following requirements:

- RAM minimum 4 MB
- Processor minimum 386SX/25MHz
- HD minimum 2.5 MB free memory
- Operating system Windows 2000 is necessary

The service PC must be connected via connecting cable part no. 66 55 745 to the connection socket of the generator. The socket is mounted on the right side behind a small cover (do not insert the diskette in the drive yet).

Configuring the service PC

All service programs use the RS232 port to communicate with the MAMMOMAT Novation^{DR}. This port is usually handled as COM1 by the OS of the service PC. Modern PCs can be equipped with new types of communication hardware, e.g. infrared port and built-in modem, which may act as COM1 or share resources with COM1. This could cause the service programs of the MAMMOMAT Novation^{DR} to malfunction so that the OS and computer BIOS must be re-configured.

The following procedures are designed to ensure general compatibility with the OS's Windows® 95, Windows® 98 and Windows® 2000 Pro on modern PCs. If the settings are saved, this procedure has to be performed only once.

Configuring the computer BIOS

1. Enter the BIOS setup (usually by pressing <**F2**>) during the BIOS boot sequence.
2. Find the configuration of the IrDA (Infrared device) port and disable it.
3. Find the configuration of a built-in modem and make sure it is configured as COM3.
4. Find the configuration of COM1 and make sure it uses the **IRQ 4** interrupt and the memory address range **03F8 - 03FF**.
5. Save the BIOS settings and restart the PC.

Configuring Windows® 2000 Pro

1. Choose **Settings** from the start menu.
2. Choose **Control panel**.
3. Choose **System**.
4. Choose the **Hardware** tab.
5. Press the **Device manager** button.

   If the IrDA port was disabled in the computer BIOS, it should not be present in the list of available hardware. If the IrDA is, nevertheless, present and its icon is not marked with a red cross, proceed as follows:
6. Double-click on the **Device** row.
7. Choose the **General** tab in the displayed dialog box.
8. In the **Device usage** section, change the status to **Disabled in the current hardware profile**.
9. Exit the dialog by pressing the **OK** button.

After completion of the configurations described above, the service program should run without difficulties.

Starting up and using the service PC - service program

1. Switch the MAMMOMAT **ON** and connect the service PC.

   After initialization, the service PC shows: **C:\>**

2. Insert the diskette with the service program.
3. Select the appropriate drive **A: or B:** and then press <ENTER>. The screen shows: **A:\>** or **B:\>**
4. Start the service program by typing "m3000.exe" (extension -c if you have a color display), then press <ENTER>.

   The program asks for the user name: **Your name, please**

   Type the name of the technician, for example NN, and then press <ENTER>.
5. The program asks for the password: **Password, please**

   Type the password (********) and then press <ENTER>.
6. The window shows: **PROGRAM MODE; mode: Normal**

   If **Mode: Normal** is the correct choice then press <ENTER> or

   if **Mode: Stand-alone** is required, press the <SPACE> key once and then press <ENTER>.

   The window shows: **Main menu**
7. Select the program part to be used via the arrow keys, then press <ENTER>. The selected program part is shown with a background: **Configuration**

   If necessary, additional subroutines can be selected here in a similar manner.
8. Make the necessary entries in the appropriate part of the program. Save the entered data with **<F2>**. Page back in the program with **<ESC>**. The appropriate instructions are displayed on the monitor.

End the procedure with the service PC via **<F10>**.

Troubleshooting

If communication with the MAMMOMAT Novation^{DR} still cannot be established, follow the instructions in this section. The following procedure will disable buffering of the RS232 port. This example is for Windows® 2000 Pro.

1. Choose **Settings** from the start menu.
2. Choose **Control panel**.
3. Choose **System**.
4. Choose the **Hardware** tab.
5. Press the **Device manager** button.
6. Expand the **Ports** row.
7. Double-click on the **COM1** row.
8. Choose the **Port settings** tab.
9. Press the **Advanced** button.
10. Uncheck the **Use FIFO buffers** checkbox.
11. Exit the dialog by pressing the **OK** button.

Configuration

System type

The **System type** selection is not used with MAMMOMAT Novation^{DR}.

Anode

Select: **Main menu => Configuration => Anode**

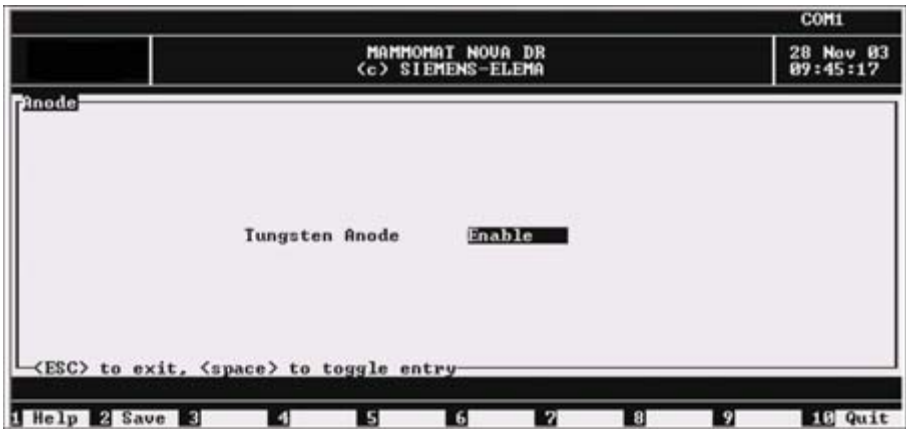

Fig. 2: Anode

Activation and deactivation of the tungsten anode. When deactivated, it will not be possible to select the W/Rh alternative on the control panel.

NOTE	**With MAMMOMAT Novation^{DR}, always “Enable”.**

Show configuration file

Select: **Main menu => Configuration => Show configuration file**

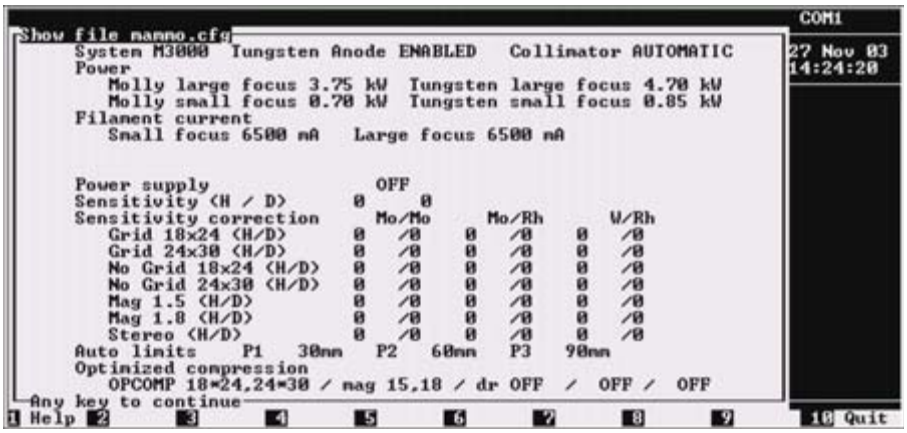

Fig. 3: Show configuration file

This menu displays the system configuration as stored in the mammo.cfg file.

The file must be stored before it can be displayed, see (Fig. 4 / p. 12).

NOTE	**All data are examples and may vary for the unit in question.**

Save configuration file

Select: **Main menu => Configuration => Save configuration file**

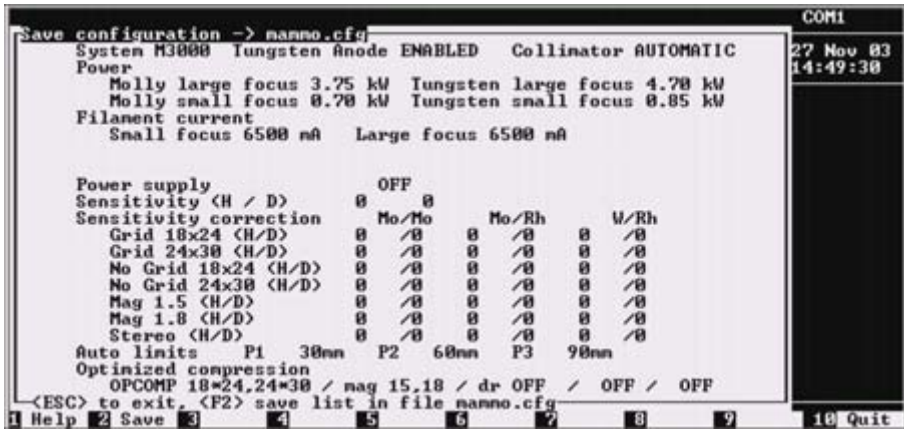

Fig. 4: Save configuration file

This menu is used for storing information about the system configuration in the **mammo.cfg** file. Press <**F2**> to save the file.

If the service program was started from a floppy disk, the file will be stored on floppy. If the service program was started from the hard disk, the file will be stored on hard disk.

AEC

Select: **Main menu => Configuration => AEC => ...**

The following **AEC** menu options are not used with MAMMOMAT Novation^{DR}.

- Reset installation parameters
- Detector normalization
- AEC correction tables
- Sensitivity correction
- Copy H to D
- Copy D to H
- Sensitivity

Miscellaneous

Miscellaneous -> DLF switch

Select: **Main menu => Configuration => Miscellaneous => DLF switch**

Fig. 5: Miscellaneous, DLF switch

Activation and deactivation of the filament current adaptation. When activated, adaptation is performed after a total of ten exposures have been made with the actual focus if the deviation of the average value from the nominal value is not within **-15%** to **+ 5%**.

Miscellaneous -> Printer

Select: **Main menu => Configuration => Miscellaneous => Printer**

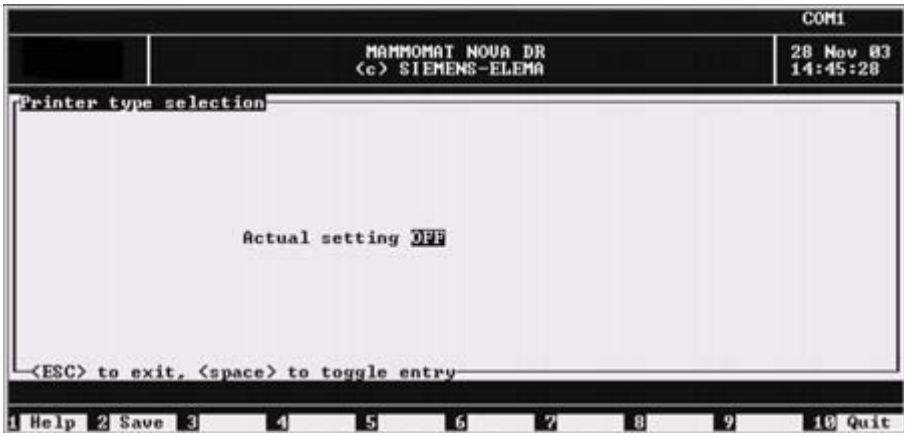

Fig. 6: Miscellaneous, printer

Toggles the printer **ON** or **OFF**.

Miscellaneous -> Power supply

Select: **Main menu => Configuration => Miscellaneous => Power supply**

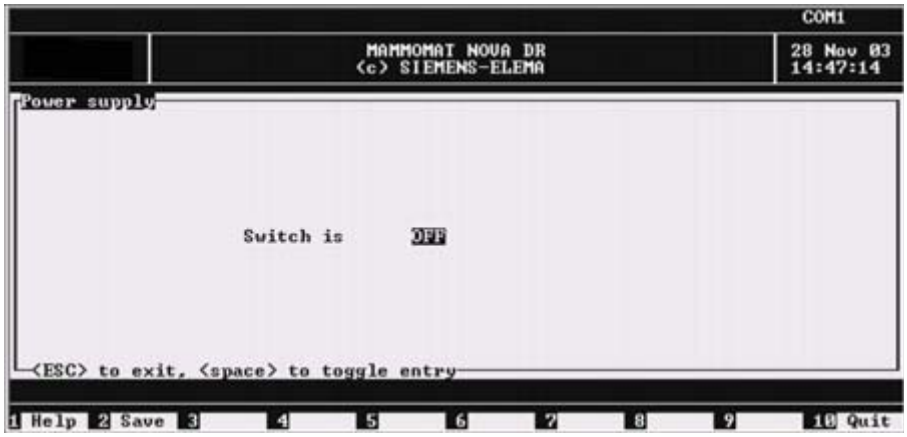

Fig. 7: Miscellaneous, power supply

Indicates whether the MAMMOMAT Novation^{DR} is powered by an external power supply (e.g. Power Aid).

Miscellaneous -> Potentiometer check

Select: **Main menu => Configuration => Miscellaneous => Potentiometer check**

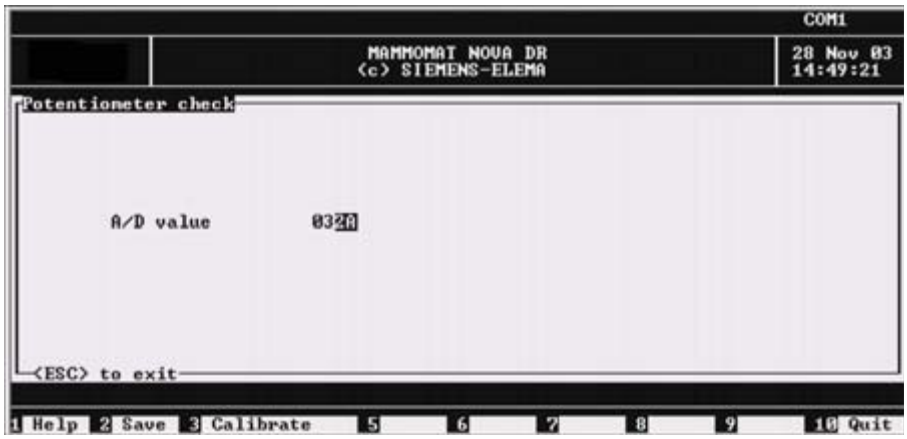

Fig. 8: Miscellaneous, potentiometer check

Sampled calibration value for the return current through the four potentiometers “preset force”, “preset angle”, “thickness” and “angle”. This return current is continuously monitored by the system. Should the return current deviate too greatly from the calibration value, this is probably due to a faulty potentiometer or a contact failure with one of the potentiometers, which results in error code 825 or 826.

Miscellaneous -> Panel programming

Select: **Main menu => Configuration => Miscellaneous => Panel programming**

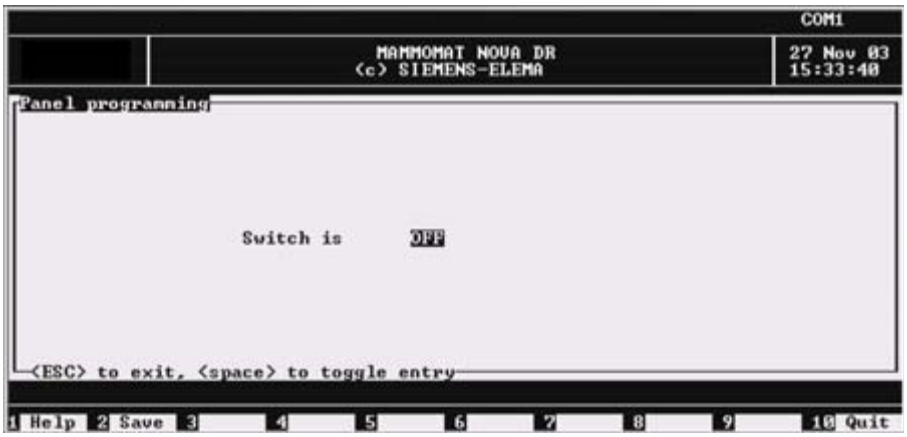

Fig. 9: Miscellaneous, panel programming

Activation and deactivation of the memory button on the control panel, making it possible to change the program settings for the four programs.

With the switch set to “OFF”, any change of data is blocked.

NOTE	**Should be switched “OFF”.**

Miscellaneous -> Auto limits

Select: **Main menu => Configuration => Miscellaneous => Auto limits**

Fig. 10: Miscellaneous, auto limits

Set the upper thickness limits for programs 1-3.

Program **1** has a lower limit of **0 mm** and program **4** has an upper limit of **180 mm.**

Supposing the above values are stored in auto mode:

- The program key **P1** is automatically selected with a compression thickness between **0** and **29 mm**.
- The program key **P2** is automatically selected with a compression thickness between **30** and **45 mm**.
- The program key **P3** is automatically selected with a compression thickness between **46** and **59 mm**.

- The program key **P4** is automatically selected with a compression thickness equal to or greater than **60 mm**.

Miscellaneous -> Cassette loaded check

Select: **Main menu => Configuration => Miscellaneous => Cassette loaded check**

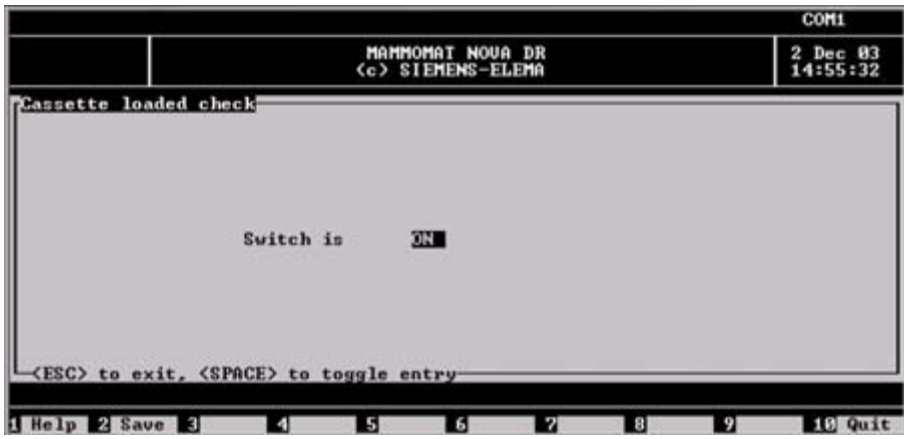

Fig. 11: Miscellaneous, cassette loaded check

Activate or deactivate the check for whether a cassette is loaded/reloaded.

When this function is activated, the cassette symbol on the control panel will light up when the inserted cassette has been exposed or if no cassette is inserted. In this case exposure release is blocked. The film cassette must be changed after each exposure.

During a service operation, it might be helpful to set the switch to “OFF”. When finishing a service operation, do not forget to set the switch back to the original setting.

Miscellaneous -> Illumination time

Select: **Main menu => Configuration => Miscellaneous => Illumination time**

Fig. 12: Miscellaneous, illumination time

Duration of switched-on field light (collimator lamp) - 1-99 s.

Set the duration according to the customer’s requirements.

Miscellaneous -> Software version info.

Select: **Main menu => Configuration => Miscellaneous => Software version info.**

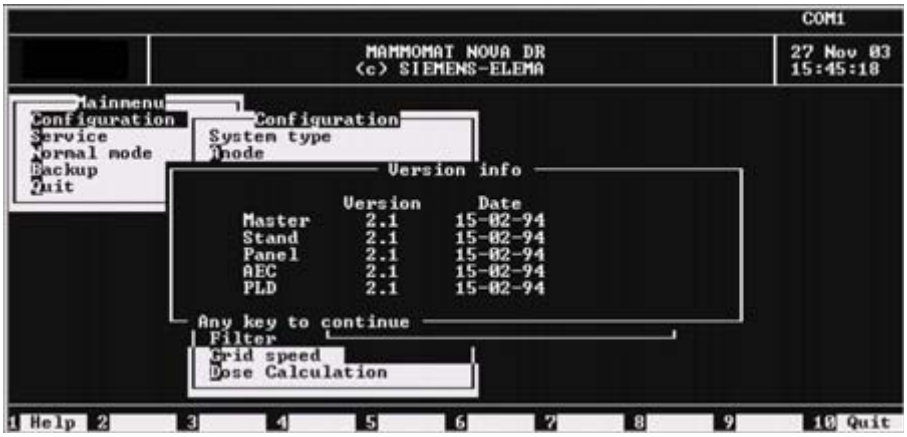

Fig. 13: Miscellaneous, software version info.

Shows software versions (and their release dates) used in the system.

Filament

Select**: Main menu => Configuration => Filament**

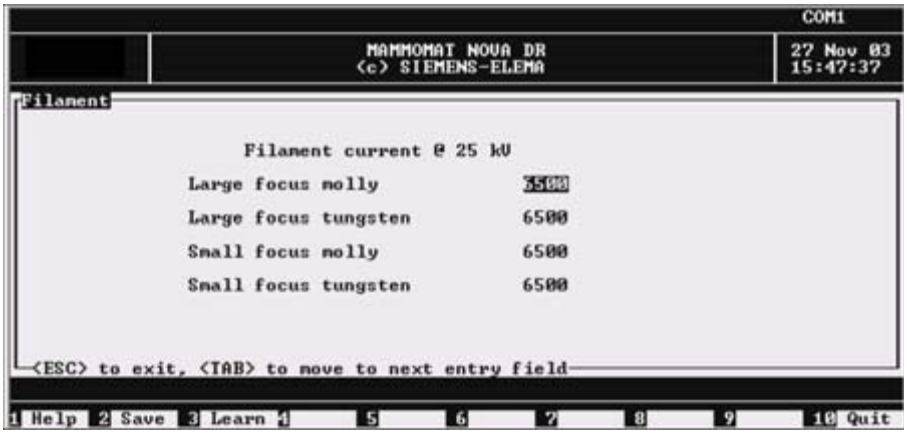

Fig. 14: Filament

Indicates the adapted filament current of available anode materials for large and small focus.

Adaptation exposures for the filament current are also made in this menu.

Pressing F3 sets the exposure parameters on the control panel, and subsequently pressing Alt-F6 starts the exposure. Repeat this procedure until the tube current deviation is within ±5%.

If the tube has been replaced, program the filament current value to be 200 mA less than the value stated in the test certificate as a pre-adjustment. (e.g. if tube value is 6900, program 6700.)

If a new filament current has been entered you must save the new value (press F2) before the learn filament operation can be performed.

NOTE

The Dynamic Learn Filament may change this adjustment. But the DLF will only learn when the exposure time is longer than 60 ms.

Clock

Select: **Main menu => Configuration => Clock**

Fig. 15: Clock

Indicates date and time.

Date and time should be correct because they are used when storing an error message and marking films.

Compression

Compression -> Configuration

Select: **Main menu => Configuration => Compression => Configuration**

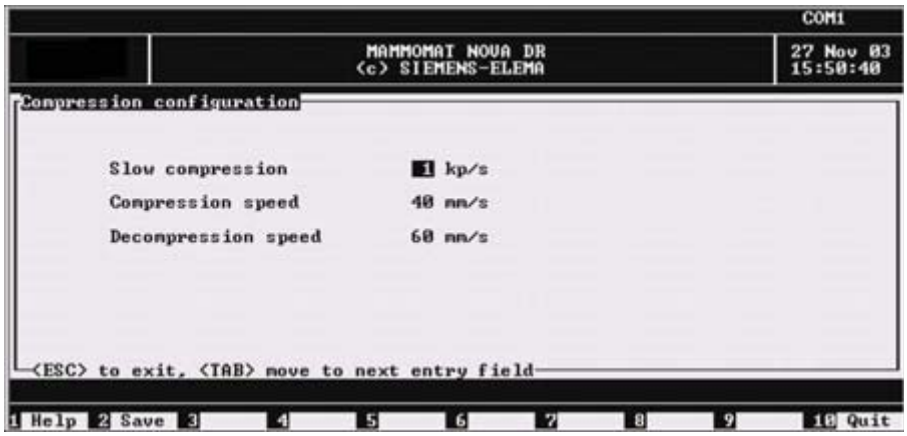

Fig. 16: Compression configuration

Slow compression

When the compression force exceeds 1 kg (10N), the force increase per second is regulated. The value indicates the reference value for the regulation.

Compression speed

Speed of compression plate in mm/s during compression. Admissible values: 1 - 80. A higher value will not generate an error, nor will it cause any speed increase.

Decompression speed

Speed of compression plate in mm/s during decompression. Same values as above.

Compression -> Calibration

Select: **Main menu => Configuration => Compression => Calibration**

Fig. 17: Compression calibration DR

Force = 0 kp

Sampled calibration value for the force sensor at a compression force of **0 kp** after running the compression plate downwards. Stop before reaching the object table.

Force = 20 kp

Sampled calibration value for the force sensor at a compression force of **20 kp**. Put the scale on the object table and compress to **20 kp** by motor only. If **20 kp** is exceeded, restart from **0 kp**!

Preset force = 3 kp

Sampled calibration value with the preset force potentiometer set to minimum (turned **counter clockwise** to end position).

Preset force = 20 kp

Sampled calibration value with the preset force potentiometer set to maximum (turned **clockwise** to end position).

Thickness - bottom (HEX)

Sampled calibration value for the thickness sensor, when the compression plate is in the bottom position.

Thickness - bottom (mm)

Measured distance between compression plate and object table, when the compression plate is in the bottom position. If the compression plate reaches the object table (normal case), type in **0**.

Thickness - top (HEX)

Sampled calibration value for the thickness sensor, when the compression plate is in the uppermost position.

Thickness - top (mm)

Measured distance between compression plate and object table when the compression plate is in the uppermost position. Measure with a ruler.

Compression -> Optimized compression

Select: **Main menu => Configuration => Compression => Optimized compression**

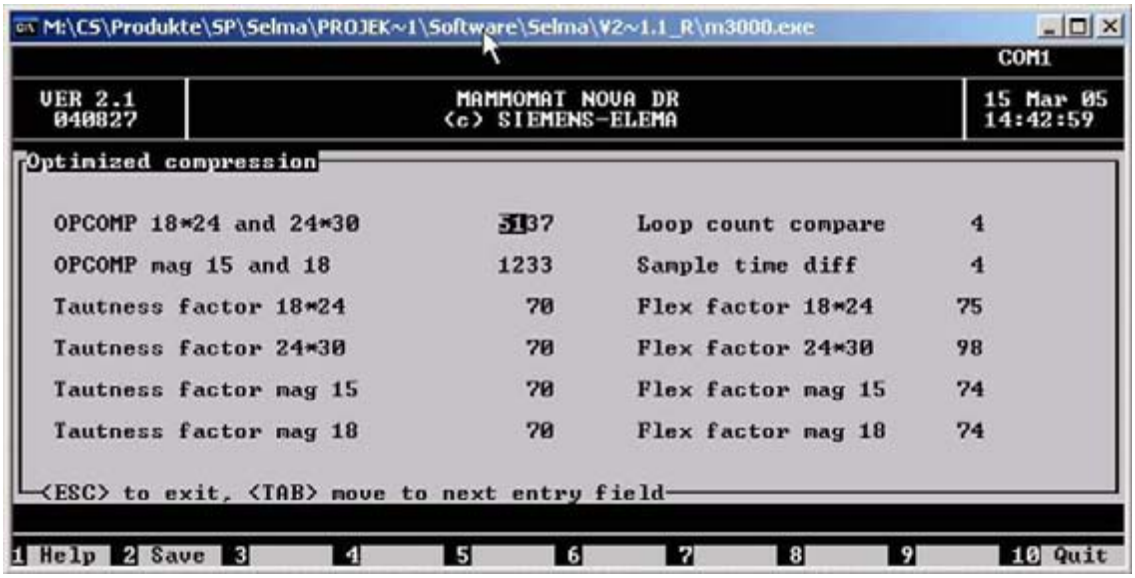

Fig. 18: Compression, optimized compression

OPCOMP code 18x24 and 24x30

Enable or disable OPCOMP. A correct input code will enable OPCOMP as shown in (Fig. 18 / p. 20).

The enable code for optimized compression is 5137. Any other number disables optimized compression.

Adapting OPCOMP

If the factory-set OPCOMP is not to the customer's satisfaction, an adjustment can be made via the tautness factors in the "Optimized compression" table. A lower tautness value will increase the compression force and vice versa.

Increase/decrease the tautness factor e.g. by 10 the first time. Let the customer use this setting for at least two weeks before making further changes.

NOTE

OPCOMP has been thoroughly tested by Siemens. If any factors are changed, OPCOMP will no longer be an optimization of compression force and image quality according to the Siemens clinical test.

Tautness factor 18x24

This factor determines how hard a breast is pressed. A lower tautness factor applies more pressure to the breast.

Tautness factor 24x30

This factor determines how hard a breast is pressed. A lower tautness factor applies more pressure to the breast.

Loop count compare

Number of times that the OPCOMP condition should be fulfilled to stop compression.

Sample time diff

Table index difference (time) between samples of thickness, used to determine if the OPCOMP condition is fulfilled.

Flex factor 18x24

A value of the mechanical system's flexibility. This value is usually factory-defined.

Flex factor 24x30

A value of the mechanical system's flexibility. This value is usually factory-defined.

Compression -> Optimized compression DR

Select: **Main menu => Configuration => Compression => Optimized compression DR**

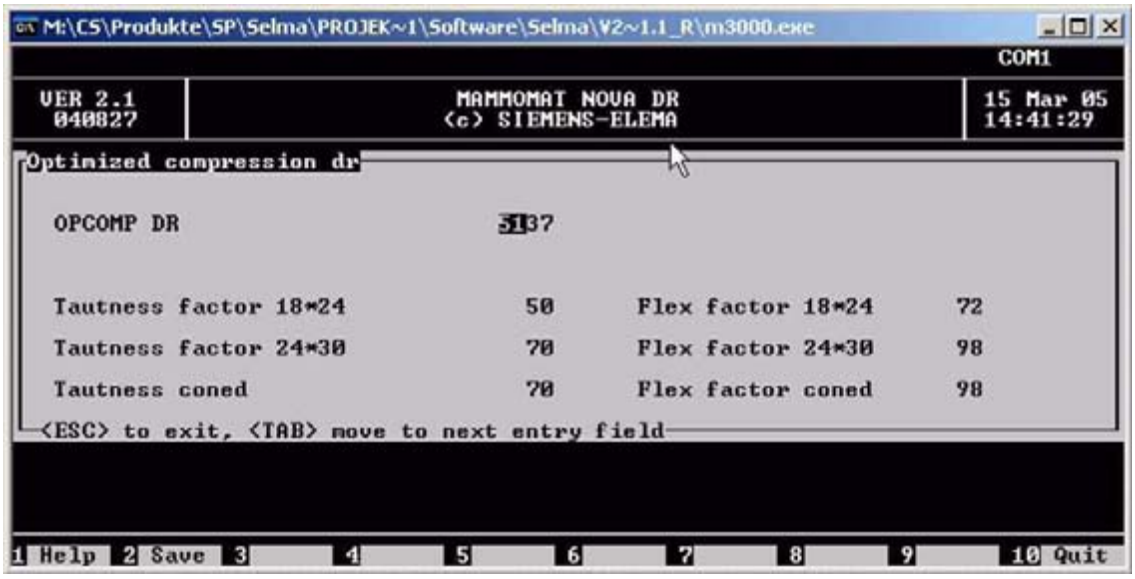

Fig. 19: Compression, optimized compression DR

OPCOMP code 18x24 and 24x30

Enable or disable OPCOMP. A correct input code will enable OPCOMP as shown in (Fig. 19 / p. 21).

Adapting OPCOMP

If the factory-set OPCOMP is not to the customer's satisfaction, an adjustment can be made via the tautness factors in the "Optimized compression" table. A lower tautness value will increase the compression force and vice versa.

Lift

Select: **Main menu => Configuration => Lift**

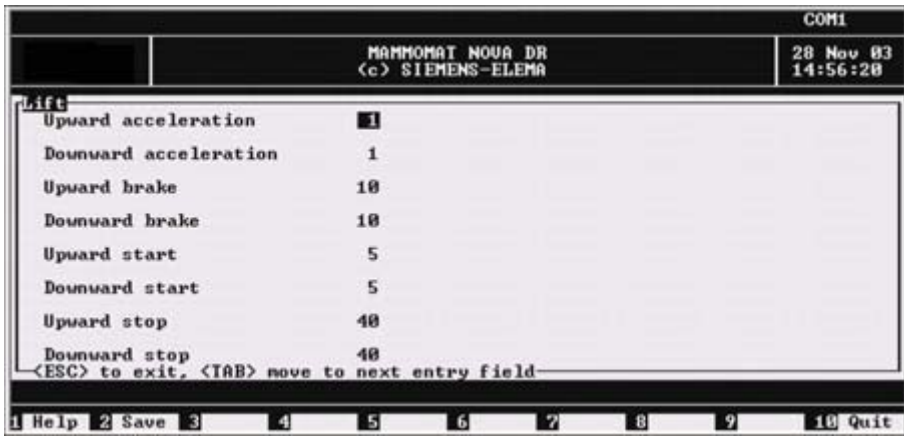

Fig. 20: Lift

Upward acceleration

To attain the desired acceleration of the lift movement, the pulse width of the motor control signal is ramped up. This value is a measure of the acceleration rate at the start of the lift movement in an upward direction. It indicates the increase of the duty cycle on the signal for each change event, which occurs every 10 ms.

Admissible values: 1 - 99. The higher the value, the faster the acceleration.

Downward acceleration

Same as above, but for downward lift movement.

Admissible values: 1 - 99

Upward brake

To attain the desired deceleration of the lift movement, the pulse width of the motor control signal is ramped down. This value is a measure of the deceleration rate at which upward lift movement stops. It indicates the decrease of the duty cycle on the signal for each change event, which occurs every 10 ms.

Admissible values: 1 - 99. The higher the value, the faster the motor is slowed.

Downward brake

Same as above, but for downward lift movement.

Admissible values: 1 - 99

Upward start

To enable an instantaneous start of the upward movement, the motor control signal starts with a predetermined pulse width. This value is a measure of the size of the pulse width (in percentage of supply voltage). Increase the value if movement does not start instantaneously, and decrease the value if movement starts too abruptly.

Admissible values: 1 - 99

Downward start

Same as above, but for downward movement.

Admissible values: 1 - 99

Upward stop

For upward movement, this parameter indicates the duty cycle at which the ramping of the pulse width is interrupted and the pulse width is set to zero.

Admissible values: 1 - 99

Downward stop

Same as above, but for downward movement.

Admissible values: 1 - 99

Rotation

Rotation -> Configuration

Select: **Main menu => Configuration => Rotation => Configuration**

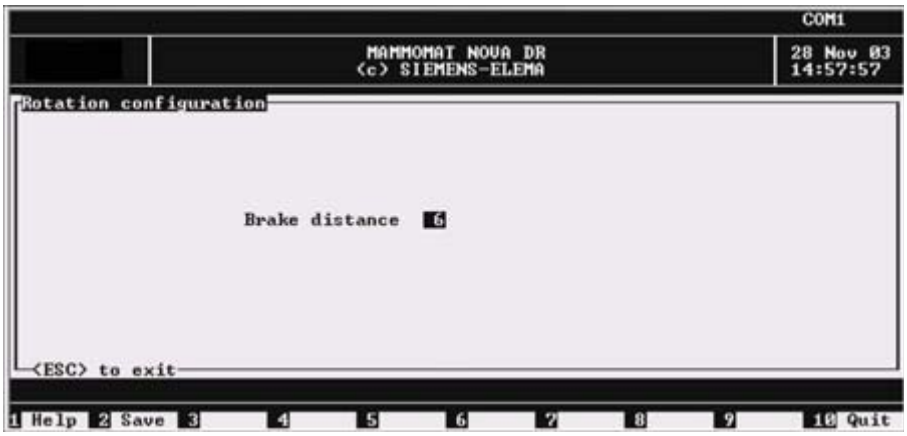

Fig. 21: Rotation configuration

The brake distance of the rotation of the swivel arm system is measured in degrees, i.e. how many degrees before the desired stop angle is the rotation slowed.

Rotation -> Calibration

Select: **Main menu => Configuration => Rotation => Calibration**

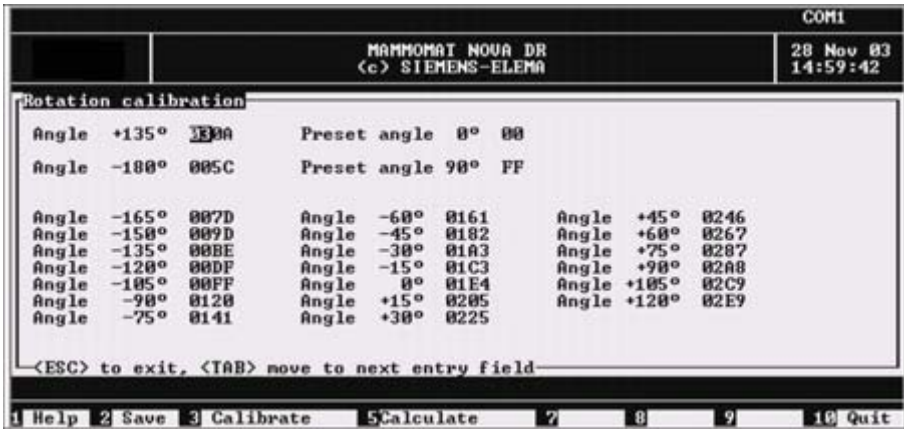

Fig. 22: Rotation calibration

F1	Displays a help text.
F2	Saves the values from the entry fields in the stand electronics.
F3	Measures the value of the highlighted entry field

F4 Enters the measured value in the entry field (after **F3** or **F5**).

F5 Calculates theoretical values for all **15**° steps from -**165**° to **+120**° based on the values in the **-180**° and **+135**° entry fields.

NOTE **F4 must be pressed after F5 and prior to F2 in order to save the calculated values.**

Preset angle - 0°

Highlight the entry field, set the preset angle potentiometer to minimum (fully **counter-clockwise**) and calibrate via **F3, F4**. Save with **F2**.

Preset angle - 90°

Highlight the entry field, set the preset angle potentiometer to maximum (fully clockwise) and calibrate via **F3, F4**. Save with **F2**.

Preparing for angle calibration

Prior to calibrating the angles, highlight **+135**° and enter **03FF**, highlight **-180**° and enter **0000**, press **F5** followed by **F4**. Save with **F2**.

Angle +135°

Highlight **+135**°. Run the rotation motor to approx. **+135**° (near the CW stop) and move the stereo lever fully to stereo position. If necessary, rotate the head slightly with the motor until the lever can be fully engaged. Rotate the head upwards (towards **0**°) to the stereo stop and back to the center position until it stops. Calibrate the value via **F3** followed by **F4**.

Angle -180°

Highlight **-180**°. Run the rotation motor to approx. **-180**° (near the CCW stop) and move the stereo lever fully to stereo position. If necessary, rotate the head slightly until the lever can be fully engaged. Rotate the head upwards (towards **0**°) to the stereo stop and back to the center position until it stops. Calibrate the value with **F3** followed by **F4**.

Angle -165° to +120°

Press **F5** followed by **F4** to recalculate approximate values for the angles prior to calibration of the remaining angles. Save with **F2**.

Highlight **-165**°. Run the rotation motor to approx. **-165**° and move the stereo lever fully to stereo position. If necessary, rotate the head slightly until the lever can be fully engaged. Rotate the head upwards (towards **0**°) to the stereo stop and back to the center position until it stops. Calibrate the value via **F3** followed by **F4**.

Move the stereo lever back to normal mode and run the rotation motor to the next position, **-150**°. Highlight **-150**° and calibrate as above. Calibrate all the remaining values in the table in the same manner. It is sufficient to calibrate each value via **F3, F4** and subsequently save all the values with **F2**.

Check **0**° and all **15**° steps from **0**° to ±**90**° for proper stereo lever operation by setting the preset angle control to **15, 30**°, etc. and run the rotation motor to both plus and minus angles. **0**° is checked by allowing the head to stop when going from positive angle values to negative angle values and vice versa. Re-calibrate any angle which needs improve-

ment by highlighting it and calibrating as above. Remember to save (**F2**) after performing a re-calibration.

NOTE	**The angles must be reprogrammed if the tube angle pot. R803 or the CPU D801 is changed.**

Collimator

Collimator -> Calibration of beam field

Select: **Main menu => Configuration => Collimator => Calibration of beam field**

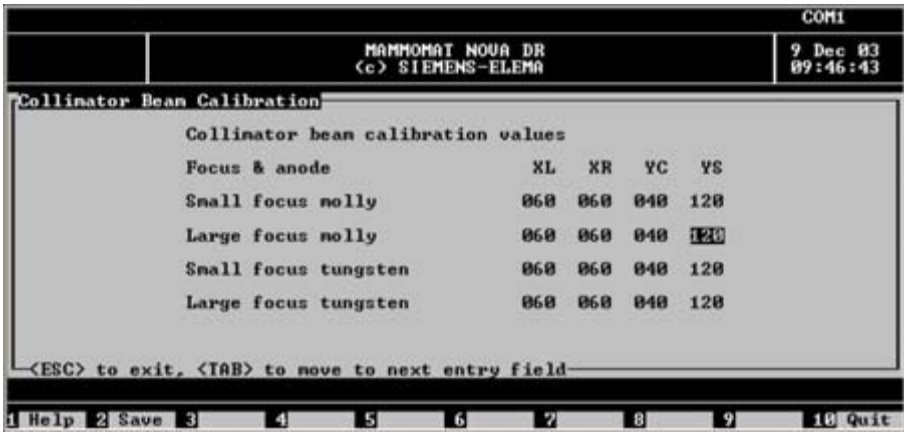

Fig. 23: Collimator, calibration of beam field

The dialog shows the values for the different parameters necessary for calibrating the beam field. These parameters are the measurements from the edge of the object board to the edge of the projection of the beam field (in mm). The names of the parameters used in the current version of the service program are temporary and can be changed if desired.The parameters are grouped for each anode material and focus combination.

If the values have been changed, the new values are saved by pressing the **F2** key. The values are then stored in the internal memory of the MAMMOMAT Novation^{DR}.

Do not use the **F10** key to exit this program for collimator adjustment. If **F10** was used, the system must be restarted and this programming has to be repeated.

However, when the dialog is exited, the service program will send a request to the MAMMOMAT Novation^{DR} to open the collimator plates to their default position.

NOTE	**Do not use the F10 (quit) key to exit this collimator adjustment. If F10 was used accidentally, the system must be shut down and re-started to be able to begin the collimator adjustment again.**

Collimator -> Calibration of light field

Select: **Main menu => Configuration => Collimator => Calibration of light field**

Fig. 24: Collimator, calibration of light field

The dialog shows the values for the different parameters necessary for calibrating the light field. These parameters are the measurements from the edge of the object board to the edge of the projection of the light field (in mm). The names of the parameters used in the current version of the service program are temporary and can be changed if desired.The parameters are grouped for each anode material and focus combination.

Confirm the values by pressing the escape key. If the values have been changed, the new values are saved by pressing the **F2** key. The values are then stored in the internal memory of the MAMMOMAT Novation^{DR}.

Do not use the **F10** key to exit this program for collimator adjustment. If **F10** was used, the system must be restarted and this programming has to be repeated.

However, when the user leaves the dialog, the service program will send a request to the MAMMOMAT Novation^{DR} to open the collimator plates to their default position.

NOTE	**Do not use the F10 (quit) key to exit this collimator adjustment. If F10 was used accidentally, the system must be shut down and restarted to be able to begin the collimator adjustment again.**

Collimator -> Calibration of wing difference

Select: **Main menu => Configuration => Collimator => Calibration of wing difference**

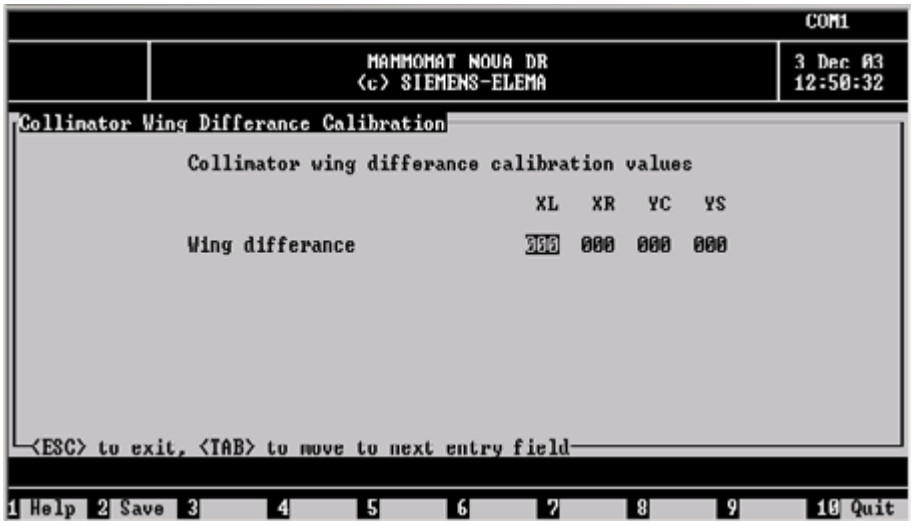

Fig. 25: Collimator, calibration of wing difference

The dialog shows the values for the different parameters necessary for calibrating the wing. These parameters are the measurements from the edge of the digital detector to the edge of the projection of the light field (in mm). The names of the parameters used in the current version of the service program are temporary and can be changed if desired.

Set all values to “000” and save by pressing the F2 key. The values are then stored in the internal memory of the MAMMOMAT NOVATION^{DR}.

Do not use the “F10” key to exit this program for collimator adjustment. If “F10” was used, the system must be restarted and this programming has to be repeated.

However, when the user leaves the dialog, the service program will send a request to the MAMMOMAT NOVATION^{DR} to open the collimator plates to their default position.

NOTE	**Do not use the F10 (quit) key to exit this collimator adjustment. If F10 was used accidentally, the system must be shut down and re-started to be able to begin the collimator adjustment again.**

Filter

Select: **Main menu => Configuration => Filter**

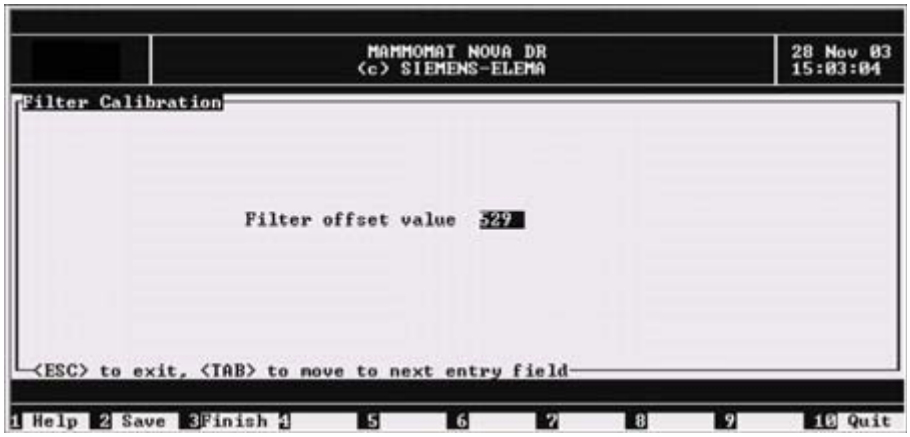

Fig. 26: Filter

This dialog shows the filter offset value which is used for calibrating the filter. It is possible to test different values by saving them to the internal memory of the MAMMOMAT Novation^{DR} by pressing the function key **F2**. To exit the dialog and move the filter to its default position, press function key **F3**.

NOTE

Do not use the F10 (quit) key to exit this filter adjustment. If F10 was used accidentally, the system must be shut down and restarted to be able to begin the filter adjustment again.

Grid speed

Select: **Main menu => Configuration => Grid speed**

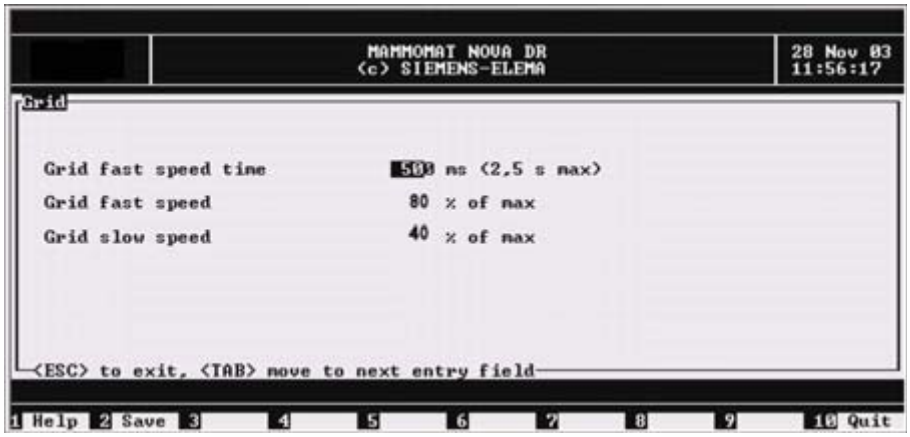

Fig. 27: Grid speed

Grid fast speed time

The time during which the grid is moving at high speed after the start of radiation.

Admissible values: 10-2500 ms

Grid fast speed

Indicates the high-speed reciprocation of the grid applied after the start, i.e. during exposure. The speed is indicated as a percentage of the maximum pulse width of the grid motor control signal.

Admissible values: 1 - 99. The higher the value, the faster the motor.

Default value 80%

Grid slow speed

Indicates the low speed of the grid after transition from the high speed. The speed is indicated as a percentage of the maximum pulse width of the grid motor control signal.

Default value 40%

Dose calculation

Dose calculation - enable/disable

Select: **Main menu => Configuration => Dose calculation => Enable/disable**

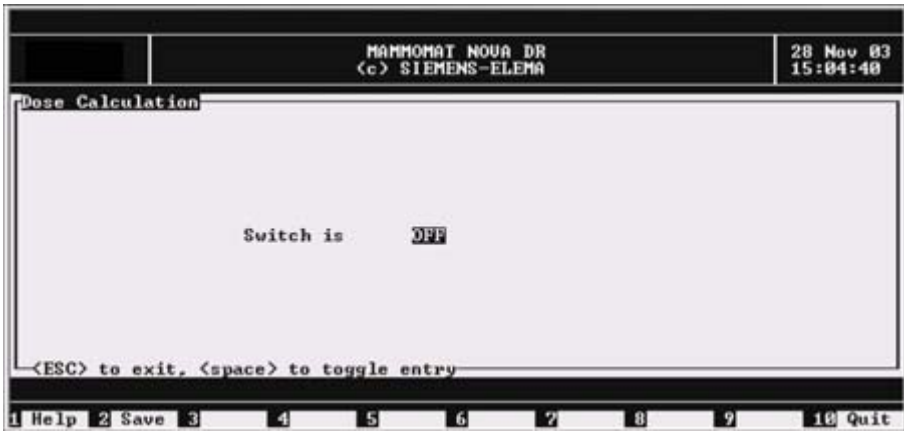

Fig. 28: Dose calculation

To show the calculated dose values on the control console, enable this option (**ON**). The dose will be displayed in mAs/mGy (), the value shown will shift from mAs to dose at approx. 2-second intervals.

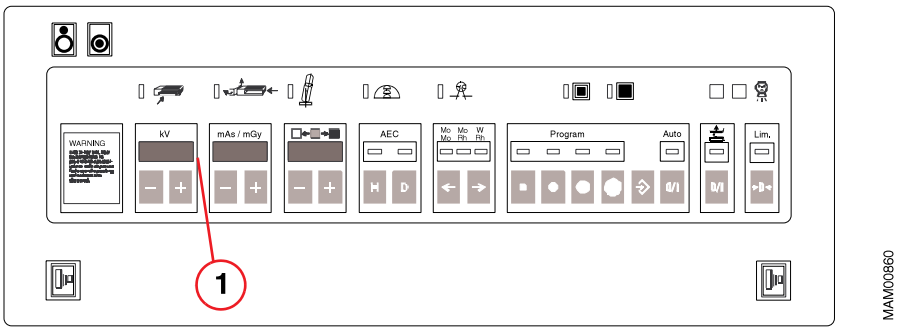

Fig. 29:

Pos. 1 mAs/mGy value

NOTE

Selecting "OFF" will only prevent dose values from showing in the mAs/mGy display. Dose calculations will still be performed and will be printed out if the printer option is installed.

Dose calculation - HVL values

Select: **Main menu => Configuration => Dose calculation => HVL values**

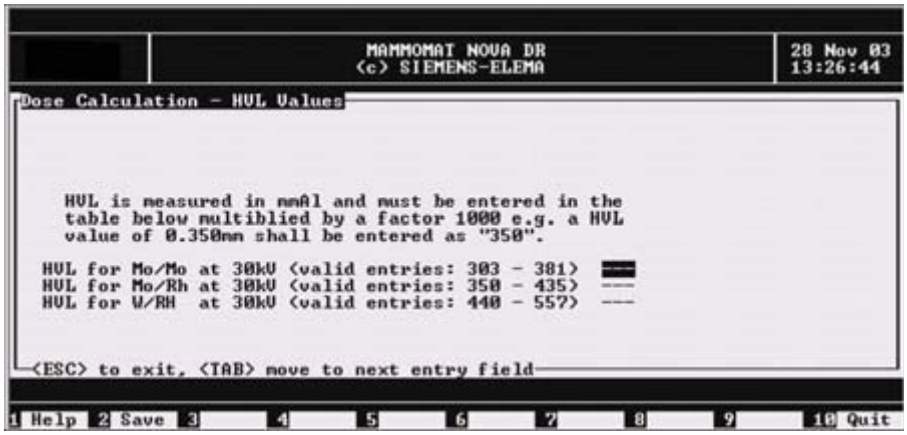

Fig. 30: HVL values

If the HVL values have been measured, enter the correct values. HVL values are entered for each anode/filter combination. The **Factory defaults** option will set standard values.

Dose calculation - Dose exchange factors

Select: **Main menu => Configuration => Dose calculation => Dose exchange factors**

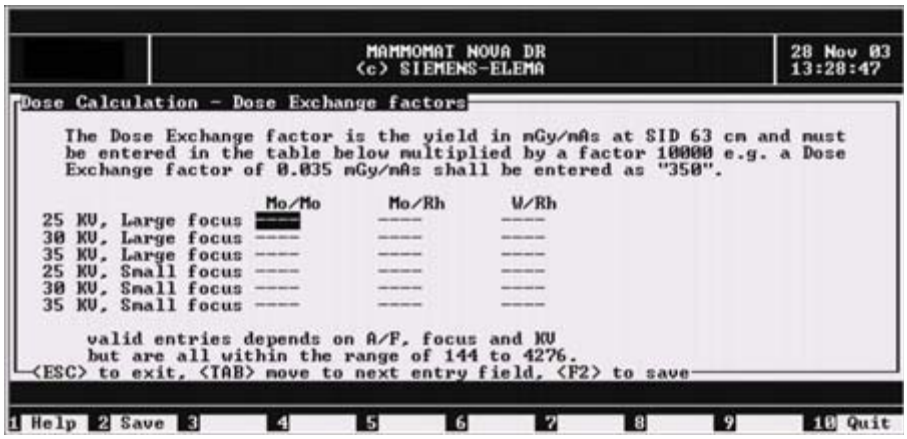

Fig. 31: Dose exchange factors

If the dose exchange factor has been measured, enter the correct values. The **Factory** defaults option will set standard values.

Dose calculation - install factory default parameters

Select: **Main menu => Configuration => Dose calculation => Factory defaults**

Fig. 32: Install factory default parameters

This option describes how to install the factory default parameters.

When installing factory default parameters, all previously entered data (HVL values and dose exchange factors) will be lost.

Service

View error buffer

Select: **Main menu => Service => View error buffer**

Fig. 33: View error buffer

When this “View error buffer” menu is selected, the error buffer in the panel is read in and displayed on the screen. Using the arrow keys, you can now scroll through the entire error buffer. If you want more detailed information about the indicated error, just press <ENTER>. The error listed at the top of the list is the most recent error. A maximum of 40 errors can be stored.

Copy error buffer to file

Select: **Main menu => Service => Copy error buffer to file**

Fig. 34: Copy error buffer to file

Choosing this menu item will read the error buffer and save to the C:errorbuf.txt file.

When using the error buffer for the first time, the errorbuf.txt file is automatically created. This file will be stored on hard disk. If you want to have it on the floppy belonging to the particular unit, transfer the file to floppy.

Delete error buffer

Select: **Main menu => Service => Delete error buffer**

Fig. 35: Dose calculation

Selecting the “Delete error buffer” menu and pressing the “Y” key empties the error buffer in the panel. If you then try to call up “View error buffer again", the service program will respond by displaying the message “Error buffer empty”.

It is recommended to empty the error buffer only after finishing a service call successfully!

Display error message

Select: **Main menu => Service => Display error message**

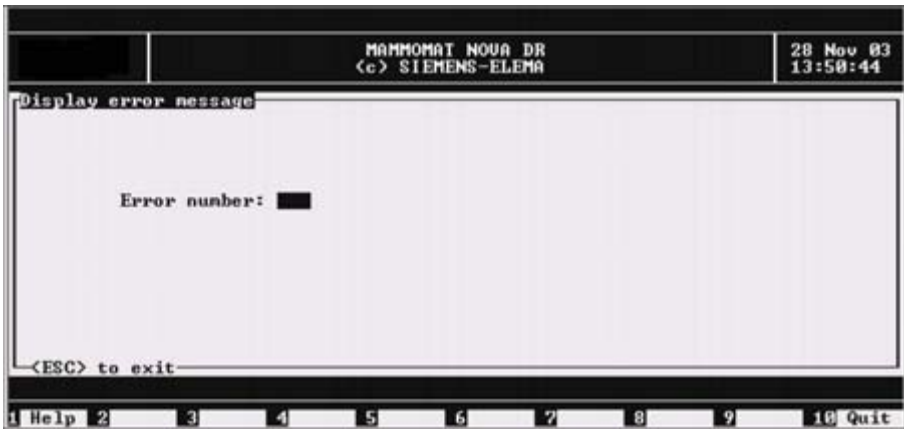

Fig. 36: Display error message

A text explaining the error will be displayed after input of an error number and <RETURN>.

Show exposure counter

Select: **Main menu => Service => Show exposure counter**

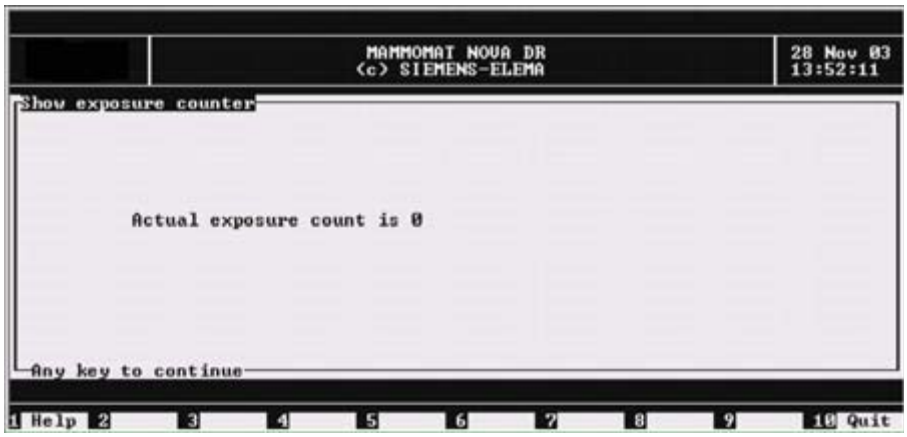

Fig. 37: Show exposure counter

By selecting the “Show exposure counter” menu, the exposure counter value in the panel is read in and displayed on the screen.

It indicates the number of exposures taken with the attached X-ray tube.

Reset exposure counter

Select: **Main menu => Service => Reset exposure counter**

Fig. 38: Reset exposure counter

Selecting the “Reset exposure counter” menu and pressing the “Y” key resets the exposure counter value in the panel to zero.

NOTE	**Only to be performed after tube replacement.**

Offset compensation test

Select: **Main menu => Service => Offset compensation test**

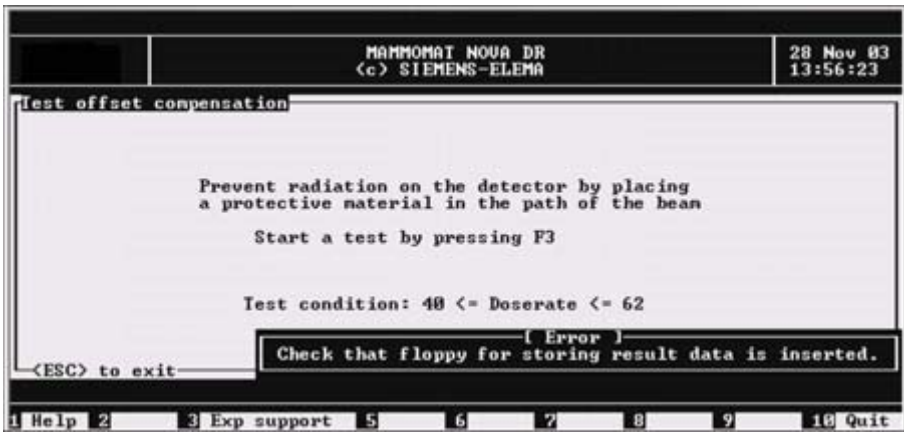

Fig. 39: Offset compensation set

This menu is used for checking the offset of the AEC. It is necessary for a backup floppy to be inserted when entering the menu since exposure data from the test will be stored on it in the “offtest.txt” result file.

By pressing <F3>, the correct exposure parameters will be set for the generator and a message box will appear instructing the user to set the correct anode/filter combination and to then press <Enter>. After an exposure has been released, the measured dose rate value is displayed in the menu. If the value differs from specified limits, an error message will be displayed.

Panel test

Select: **Main menu => Service => Panel test**

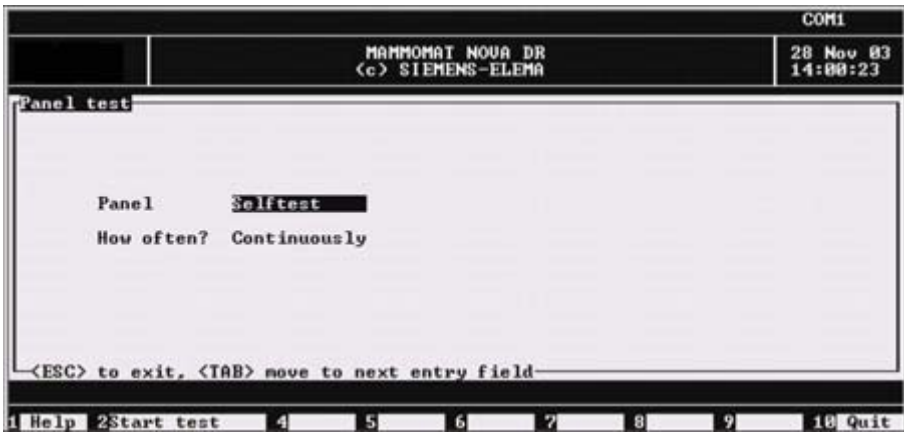

Fig. 40: Panel test

Pressing F2 start test, launches the panel self-test.

Stand test

Stand test -> A/D converter

Select: **Main menu => Service => Stand test => A/D converter**

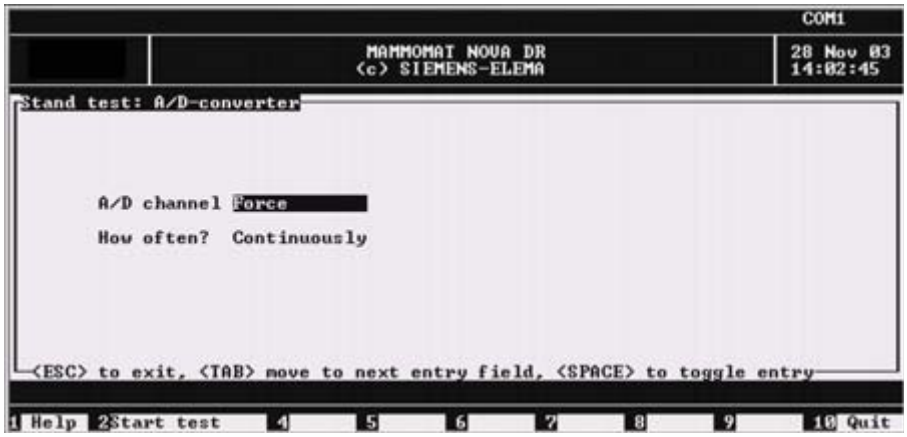

Fig. 41: Dose calculation

A/D converter test

This menu displays two fields for the selection of test data. The desired field is selected via the TAB key.

In the first field you can choose which analog input (to the CPU in the stand) shall be read off.

The possible inputs are: Force, Angle, Thickness, Preset force, Preset angle, Grid motor V and Pot check.

In the second field you can choose whether the reading shall be carried out just once or continuously (until interruption).

In both fields you can scroll through the different alternatives by pressing the space key. Press F2 or the return key to read off the desired alternative.

Stand test, grid

Selection of this menu immediately starts the grid test. If a grid movement error is detected, an error message is displayed, as usual, on the control panel.

Stand test, filter

Selection of this menu immediately starts the filter test. If a filter movement error is detected, an error message is displayed, as usual, on the control panel.

Stand test, collimator

Selection of this menu immediately starts the collimator test. If a collimator movement error is detected, an error message is displayed, as usual, on the control panel.

Stand test -> Switches

Select: **Main menu => Service => Stand test => Switches**

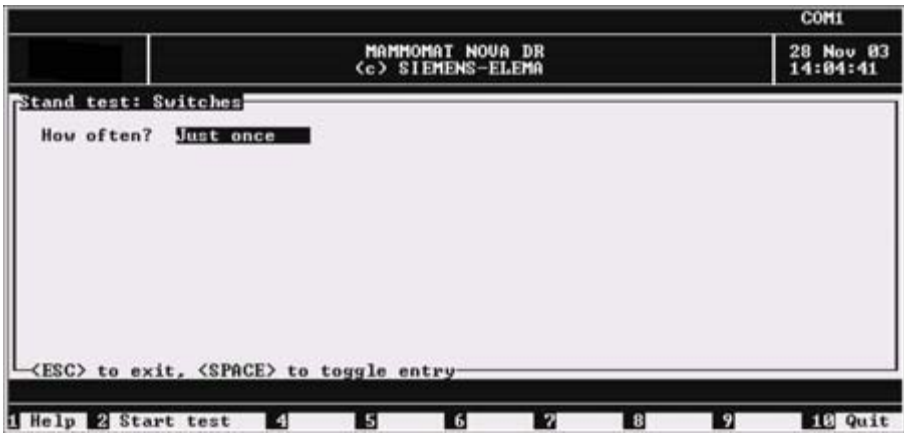

Fig. 42: Stand test switches

Switches

This menu displays one field for the selection of test data. You can choose whether the position of the switches shall be read out just once or continuously (until interruption).

Press the **space key** to choose between these two different alternatives.

Press **F2** or the return key to read off the desired alternative.

Show/save exposure info.

Select: **Main menu => Service => Show/save exposure info.**

Fig. 43: Show/save exposure info.

This menu displays exposure data from the latest exposure. Pressing <ENTER> will update the exposure data.

If an exposure has been made in the AEC mode, the exposure data can be saved by pressing <F2>. The result file will automatically be located in the same directory from which the service program was started. The name of the result file will, for example, be AE991105.txt (i.e. current date selected by the PC plus ".txt").

Tube type

Displays the anode/filter combination used during exposure.

Tube tension

Displays the kV setting (on the control panel) used during the exposure.

Compression thickness

Displays the compression thickness used during exposure.

Sensitivity

Displays the sensitivity value used during the exposure. The sensitivity is dependent on selection of speed H or D.

Sensitivity correction

Displays the sensitivity correction value used during exposure. The sensitivity correction is dependent on the selection of object table type, speed (H or D) and on anode/filter combination.

Density correction

Displays the density correction value set on the control panel during exposure.

Correction table ID

Displays the ID number of the correction table used during exposure.

Dose rate

Displays the value of the measured dose rate (counted in pulses per 100s) during exposure.

Dose correction value

Displays the correction value used during exposure and measured in pulses. The correction value is determined by comparing the dose rate to values in the AEC correction table.

Measured dose

Displays the total dose, measured in pulses.

Measured time

Displays the total time for the exposure.

Measured mAs

Displays the value of measured mAs during the exposure.

Normal mode

Generator data

Select: **Main menu => Normal mode => Generator data**

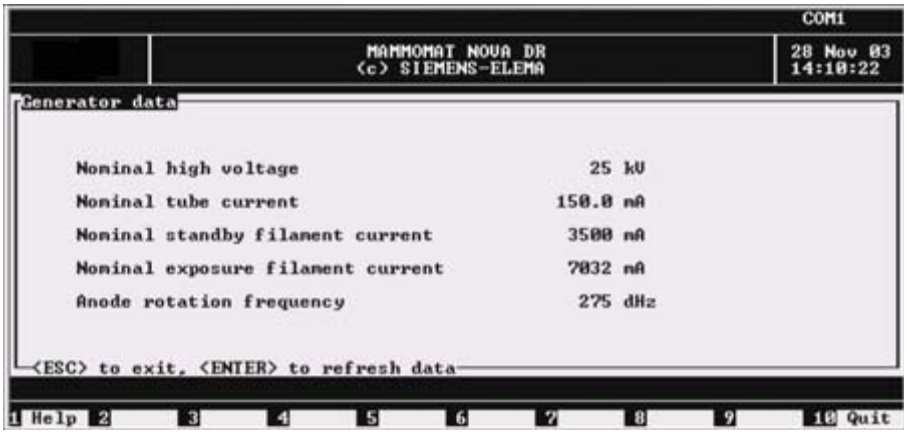

Fig. 44: Generator data

NOTE	**None of the menus under “Normal mode” can be edited.**

Nominal high voltage

Shows the kV set on the control panel.

Nominal tube current

Shows the nominal value of the tube current.

Standby filament current

Shows the nominal value of the standby filament current.

Exposure filament current

Shows the nominal value of the filament preparation.

Counter pulses for boost of rot. anode

Shows the number of inverter pulses used for the anode acceleration.

Stand data

Select: **Main menu => Normal mode => Stand data**

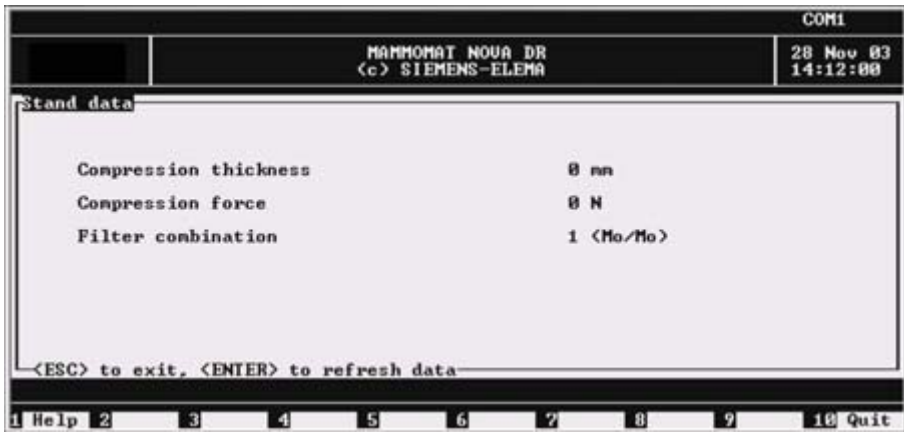

Fig. 45: Stand data

Compression thickness

Shows object thickness at last compression.

Compression force

Shows the force at last compression.

Filter combination

Shows the chosen anode/filter combination on the control panel.

AEC data

Select: **Main menu => Normal mode => AEC data**

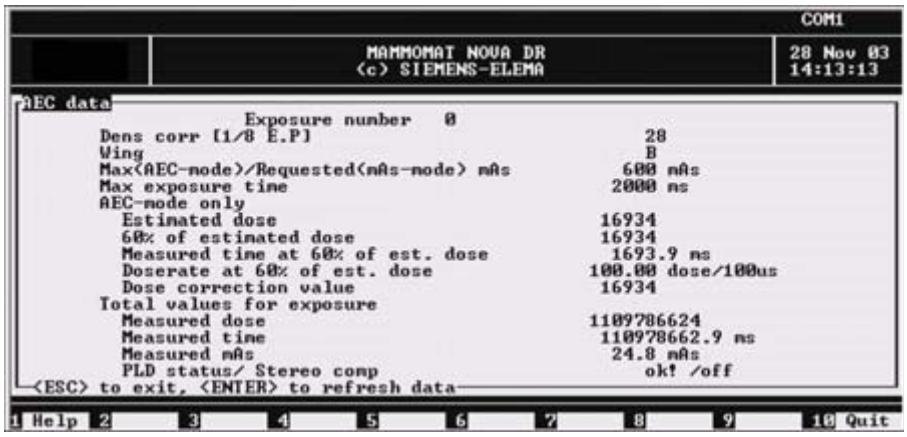

Fig. 46: ACE data

This menu displays exposure data from the latest exposure. Pressing <ENTER> will update the exposure data.

Density correction

Displays the density correction value set on the control panel during exposure.

Wing

Indicates which wing is used. (Wing A = Wing 1, Wing B = Wing 2)

Max (AEC mode)/requested (mAs mode) mAs

Shows the maximum mAs value in the AEC mode and requested mAs value in the mAs mode.

Maximum exposure time

Shows the maximum exposure time allowed for the selected operating mode.

Estimated dose

A precalculated value for the total required dose for the exposure.

60% of estimated dose

60% of the precalculated value for the total estimated dose for the exposure

Measured time at 60% of est. dose

Time measured when 60% of the estimated dose has been detected.

Dose rate at 60% of est. dose

60% of the estimated dose divided by the measured time at 60% of the estimated dose.

Dose correction value

Displays the correction value used during exposure and measured in pulses. The correction value is determined by comparing the dose rate to values in the AEC correction table.

Measured dose

Displays the total dose, measured in pulses.

Measured time

Displays the total time for the exposure.

Measured mAs

Displays the value of measured mAs during the exposure.

PLD status

If an error is reported from the PLD circuit of the AEC, an error message will appear. Normally “OK” is shown.

Stereo comp

If an exposure has been performed with a biopsy unit mounted and the tube head positioned in the stereo angle, this will be indicated by “ON”. A compensation is made in the AEC if the stereo mode is “ON” in order to compensate for differing radiation conditions due to the stereo angle.

DLF data

Select: **Main menu => Normal mode => DFL data**

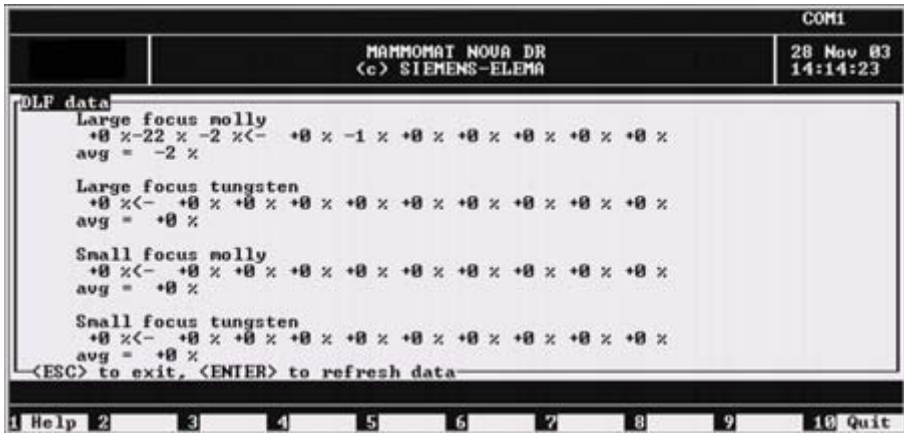

Fig. 47: DLF data

This menu shows the percentage deviation between the actual and desired tube current as well as the average deviation for the last ten exposures.

The arrow indicates the latest exposure.

Actual values

Select: **Main menu => Normal mode => Actual values**

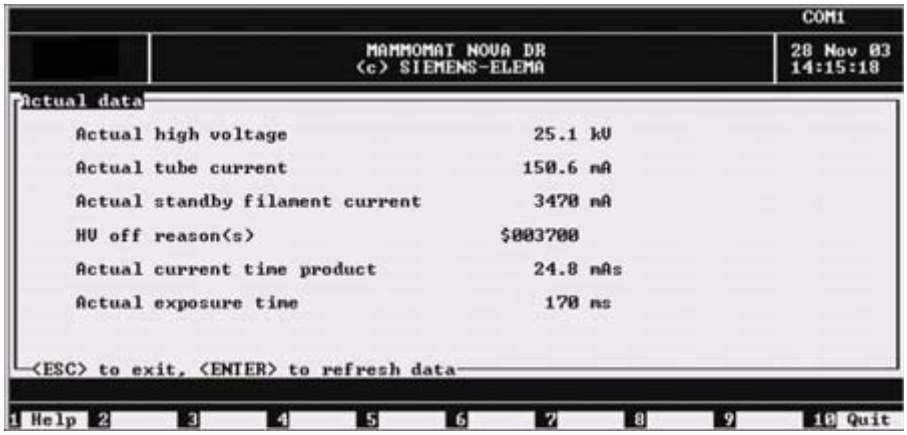

Fig. 48: Actual values

Actual high voltage

Shows the actual kV at the start of the exposure.

Actual tube current

Shows the actual tube current at the start of the exposure.

Actual filament current

Shows the actual standby filament current.

HV off reason(s)

Shows the intermediate circuit voltage applied at unit start-up.

Actual current/time product

Shows the mAs value for the latest exposure.

Actual exposure time

Shows the exposure time for the latest exposure. The time may be 400-500 ms longer than the maximum exposure time in the AEC data menu, depending on tube current reduction and how the filament current is adapted.

Backup

Select: **Main menu => Backup**

Fig. 49: Backup

This menu is used for handling different backup alternatives.

Copy installation area to disk/floppy

Will copy installation parameters for the item(s) chosen in the submenu, from the MAMMOMAT Novation^{DR} to file(s) on hard disk/floppy (C:/A:).

Type of parameters	Name of file
ACE	a_backup.txt
Panel	p_backup.txt
Stand	s_backup.tx
AEC correction labels	momo_h.txt momo_d.txt morh_h.txt morh_d.txt wrh_h.txt wrh_d.txt

Copy disk/floppy to installation area

Will copy installation parameters for the item(s) chosen in the submenu(s) from file(s) on hard disk/floppy (C:/A:) to the MAMMOMAT Novation^{DR}.

Backup procedure in Windows® 2000 Pro

The floppy drive (drive A:) the backup functionality of the service program is not compatible with Windows® 2000 Pro. In Windows® 2000 Pro, the service program fails to detect a diskette in the floppy drive and therefore cannot write or read a backup directly from the floppy drive. The following instructions describe how to solve this problem.

Copy installation area to disk/floppy

1. Open an MS-DOS or command prompt window.
2. Execute the **CD ** command
3. Execute the **MKDIR MAMMOMAT_NOVATION_DR** command
4. Execute the **CD MAMMOMAT_NOVATION_DR** command
5. Insert the service program diskette into drive **A**:
6. Execute the **A**: command
7. Start the service program as described in "Connecting the service PC" on pages 1-3.
8. In the service program, choose **Copy installation area to disk**.
9. Exit the service program
10. In the MS-DOS or command prompt window, execute the **C**: command
11. Insert an empty diskette (the backup diskette) into drive **A**:
12. Execute the **COPY *.TXT A:** command
13. Execute the **DEL *.TXT** command
14. Execute the **CD ..** command
15. Execute the **RMDIR MAMMOMAT_NOVATION_DR** command
16. Close the MS-DOS or command prompt window

Copy disk/floppy to installation area

1. Open an MS-DOS or command prompt window.
2. Execute the **CD ** command
3. Execute the **MKDIR MAMMOMAT_NOVATION_DR** command
4. Execute the **CD MAMMOMAT_NOVATION_DR** command
5. Insert the backup diskette into drive **A:**
6. Execute the **COPY A:*.TXT** command
7. Remove the backup diskette and insert the service program diskette into drive **A**:
8. Execute the **A**: command
9. Start the service program as described in "Connecting the service PC" on pages 1-3.
10. In the service program, choose **Copy disk to installation area**
11. Exit the service program
12. In the MS-DOS or command prompt window, execute the **C**: command
13. Execute the **DEL *.TXT** command
14. Execute the **"CD.."** command
15. Execute the **RMDIR MAMMOMAT_NOVATION_ DR** command
16. Close the MS-DOS or command prompt window

Quit

Select: **Main menu => Quit**

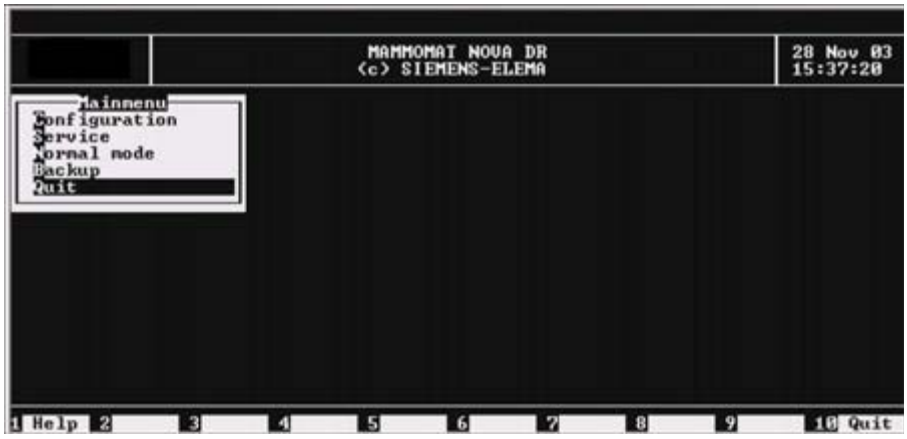

Fig. 50: Quit

<Exit> the service program. **<F10>** can also be used.

Error messages of the master Err 0XX

Err 004

“Communication master - AEC defective or AEC not ready”

Description

If the master processor (D750) can no longer activate the AEC processor via the serial interface, or if any important data from the control deck is missing, the above error message is displayed.

Fault elimination

First you must check if PC board D750 is plugged in correctly and if the connections to the power supply and to the serial interface (see wiring diagram) are functioning correctly.

If no fault can be found, PC board D750 should be replaced.

Err 005

“Flash in AEC is defective or not correctly initiated”

Description

During initialization, the AEC processor (D750) checks the data stored in its E^2PROM by means of stored check sums. If this data is incorrect or if the E^2PROM fails, the AEC processor informs the master processor via the serial interface and the above error message is displayed.

The master also generates this error if, during exposure release, communication has not yet been established with the AEC.

NOTE	**In contast, error 004 appears if communication with the master has been interrupted.**

Fault elimination

Reprogram E2PROM or replace E2PROM or PC board D750. Reprogram with the service PC, menu backup.

Err 008

“Communication master - stand defective or stand not ready”

Description

This error means that the communication between the master processor and unit processor via the serial interface is faulty or has been interrupted.

Fault elimination

Check whether the power supply and the serial interface (see wiring diagram) to the unit are functioning correctly.

Err 011

“Exposure aborted by user”

Description

If the exposure buttons are released prematurely, the exposure is aborted immediately. On the control deck, the LIMIT LED (→0←) lights up, an acoustic signal sounds and the above error message is displayed.

Fault elimination

This error indication is purely informational and does not require further action. Should it appear frequently, however, check the contacts of the exposure release buttons. Replace exposure release button(s) if necessary.

Err 012

"Time limit reached"

Description

In order to prevent the tube assembly from overloading, a timer runs during exposure. This is set with the time limit before exposure. If this timer runs down, the exposure is aborted immediately, and the above error message is displayed. Depending on the mode of operation, the time limit is calculated as follows:

AEC mode

The time limit is the power-dependent load time plus a tolerance value (approx. 400 ms).

mAs mode

The time limit is the calculated exposure time plus a certain reserve time. If this period is shorter than 2 s, 2 s are assumed. If it exceeds 2 s, a reserve time of 400 ms is added.

The time limit can be read off in ms with the service PC in "normal mode" under "AEC data". The value shown here does not include the extra 400 ms.

Fault elimination

The tube current and the filament current must be measured again using the oscilloscope (test points I_{ROE} and I_H on D750). The nominal and actual value of the tube current can be read off with the service PC in normal mode. If the actual tube current is too low, you must first ensure that the dynamic learn filament current (DLF switch) is switched on. The tube must be readjusted in any case. Should difficulties still occur, the tube current actual value acquisition must be checked (see wiring diagram).

Err 013

"mAs limit reached in AEC exposure"

Description

For safety reasons, in the case of AEC exposures, the accumulated mAs is integrated via the timer independently of the AEC. If a focus, tube assembly and kV-dependent time limit (see table) is obtained without the AEC being switched off, the exposure is aborted and the above error message is displayed.

Tube assembly	25 kV	30 kV	35 kV
P40 MoW-100G F1	196 mAs	163 mAs	140 mAs
P40 MoW-100G F2	600 mAs	500 mAs	428 mAs

P40 MoW-100G F3	238 mAs	198 mAs	170 mAs
P40 MoW-100G F4	752 mAs	627 mAs	537 mAs

Fault elimination

The dose signal from the detector or the chamber to the hardware of the AEC must be checked (see wiring diagram).

If no error can be detected, PC board D750 or D801 must be replaced.

Err 014

“kV, corrected for dose calculation, is out of range”

Description

The kV value used for glandular dose calculations is the "set kV" adjusted for the actual HVL value of the tube. This corrected kV value is outside the limits of the lookup tables used for glandular dose calculations.

Fault elimination

Reload the tube-specific HVL values with the help of the "dose calculation configuration program".

Err 020

“PC message had bad length”

Description

The length of the message sent from the service PC to the MAMMOMAT Novation^{DR} is too long.

Fault elimination

Check that the correct service program version is being used.

Er 022

“**Receive message from external unit failed”**

Description

An error occurred when the MAMMOMAT Novation^{DR} was receiving data from the PC or printer.

NOTE	**May occur if the printer is switched on/off while the rest of the system is on.**

Fault elimination

Check the cables and connectors to the PC or printer. Board 750 defective. PC/printer defective.

Err 024

“PC, ID camera or workstation has not sent ACK/NAK within two seconds. Three attempts are made”

Description

The service PC did not answer.

Fault elimination

Check the cables and connectors to the PC. PC defective.

Err 025

“PC, ID camera or workstation sends NAK three times as response to one and the same message”

Description

The service PC did not receive information from the master. Time-out occurred and service PC responds with NAK.

Fault elimination

1. Reset error on panel and try again.
2. Reset MAMMOMAT Novation^{DR} and PC.

Err 030

“Master PLD requests interruption of tube voltage”

Description

The master PDL logic has detected a type of error that is considered fatal and must terminate the exposure.

Fault elimination

1. Reset error on panel and try again.

Err 040

“The radiation protection door is open”

Description

The radiation protection door switch is not active when an exposure is being released.

Fault elimination

1. Check door switch.

Error messages of the panel Er 1XX

Err 105

“Checksum error in installation data stored in panel EEPROM”

Description

Each time the MAMMOMAT Novation^{DR} is switched on, the installation area in the E^2PROM on the control deck is checked with a shadow area also stored in the E^2PROM. If any discrepancy is detected, the above error message is displayed.

Fault elimination

The installation data can be corrected via the service PC. If this error appears more frequently, replace deck PC board D750 and reinstall the parameters in the control panel. The opdose parameters have to be programmed manually via the control deck. For the remaining parameters, use the service PC, menu backup.

Err 106

“E^2PROM program area error”

Description

When data is stored in the E^2PROM of the control panel during programming of the opdose parameters, this is read back once more to check whether it has been stored correctly. If any differences occur, the above error message is displayed.

Fault elimination

The E^2PROM in the panel must be replaced. If the error still occurs, the whole D750 must be replaced. In both cases the parameters in the control panel have to be reinstalled. The opdose parameters have to be programmed manually via the control deck. For the remaining parameters, use the service PC, menu backup.

Err 107

“No communication panel - master”

Description

If no data transmission takes place between the deck and the master during the first 20 s after power on, the control deck switches to the “stand alone” mode. The keyboard can be operated normally. If the exposure release button is operated in this mode, the above error message is displayed.

Fault elimination

The cause of this error can be an interruption on the serial interface to the master. For this reason, this connection must be checked closely.

Err 121

“The version number of EEPROM and PROM are not the same”

Description

This error is valid for the panel.

Fault elimination

Check EEPROM and PROM.

Error messages of the filament Er 3XX

Err 303

“Filament current outside limits”

Description

During “standby”, the master checks whether there is any filament current. If the filament current does not reach a predetermined value by more than 10% from nominal, the above error message is displayed.

Fault elimination

Check the fuse (see wiring diagram).

Check the filament wires.

Filament of tube assembly defective.

PC board D750 defective.

Err 304

“Filament current over limit”

Description

During “standby”, the master checks whether there is any filament current. If the filament current does not reach a predetermined value or filament current exceeds 8.5 A, the above error message is displayed.

Fault elimination

Check the fuse (see wiring diagram).

Check the filament wires.

Filament of tube assembly defective.

PC board D750 defective.

Error messages of the AEC Er 4XX

Err 401

“Error during configuration of PLD”

Description

Configuration of PLD device in AEC failed.

Fault elimination

Switch off the MAMMOMAT Novation^{DR}. Wait approx. one minute. Start up the MAMMOMAT Novation^{DR}. If the error recurs, replace the D750 circuit board.

Err 402

“Self-test of PLD failed”

Description

Gain test of circuit board D750 failed.

Fault elimination

Switch off the MAMMOMAT Novation^{DR}. Wait approx. one minute. Start up the MAMMOMAT Novation^{DR}. If the error recurs, replace the D750 circuit board.

Err 403

“Self-test timeout Fatal error in PLD’s internal program.”

Description

Timeout occurred in the PLD device in the AEC during the gain test of circuit board D750.

Fault elimination

Switch off the MAMMOMAT Novation^{DR}. Wait approx. one minute. Turn on the MAMMOMAT Novation^{DR}. If the error recurs, replace the D750 circuit board.

Err 404

“AEC CPU requests interruption of tube voltage”

Description

The processor in the AEC part of the master board requests termination of high voltage generation.

Fault elimination

Check the tube power module and the HV inverter module.

Err 405

“AEC PLD cannot perform requested operation because it is busy performing a self-test”

The PLD in the AEC part of the master board requests termination of high voltage generation.

Fault elimination

Check the tube power module and the HV inverter module.

Err 406

“PLD cannot perform requested operation because it is busy performing a self-test”

Description

PLD in AEC cannot perform requested operation because it is busy performing a self-test

Fault elimination

Acknowledge displayed error and wait approx. one minute.

Err 407

“Timeout error while erasing AEC flash memory”

Description

The D750 contains a memory device called a “flash memory”. This memory is used for storing AEC parameters and correction tables. Before writing data into the memory, it is first necessary to erase the sector in which data is to be stored. The erasing procedure is controlled by a timer. If anything goes wrong while erasing the AEC flash memory and timeout occurs, an error results.

Fault elimination

Switch off the MAMMOMAT Novation^{DR}. Wait approx. one minute. Start up the MAMMOMAT Novation^{DR}. If the error recurs, replace the D750 circuit board.

Err 408

“Timeout error while writing to the AEC flash memory (timeout in waiting for OK indication)”

Description

The D750 contains a memory device called a “flash memory”. This memory is used for storing AEC parameters and correction tables. The writing of this data is controlled by a timer. If anything goes wrong while writing to the AEC flash memory and timeout occurs, an error results.

Fault elimination

Switch off the MAMMOMAT Novation^{DR}. Wait approx. one minute. Start up the MAMMOMAT Novation^{DR}. If the error recurs, replace the D750 circuit board.

Err 409

“AEC flash test is locked (timeout of 15 seconds exceeded)”

Description

During start-up of the unit, the AEC performs a number of tests, e.g. testing of the flash memory device on D750. This testing is controlled by a timer, and if a problem occurs, a timeout is generated.

Fault elimination

Switch off the MAMMOMAT Novation^{DR}. Wait approx. one minute. Start up the MAMMOMAT Novation^{DR}. If the error recurs, replace the D750 circuit board.

Err 410

"Attempt to start an exposure before the AEC flash memory has delivered correction values"

Description

Before an AEC exposure is released, and based on the exposure settings on the panel, the AEC fetches an estimated dose from a correction table stored in the flash memory. If the exposure buttons are pressed during reading from the flash, an error will occur.

Fault elimination

Acknowledge displayed error. Wait 15 seconds. Try to perform an exposure.

Err 412

"Attempt made to start an exposure while self-test of the PLD in the AEC was in progress"

Description

An attempt was made to start an exposure while the self-test of the PLD in the AEC was in progress.

Fault elimination

Acknowledge displayed error. Wait 15 seconds. Try to perform an exposure.

Err 413

"Exposure too short, correction value could not be loaded in time"

Description

An estimated dose is pre-calculated before an exposure is released. The minimum estimated dose is defined for a minimum object thickness. For a normal object thickness (> 5 mm), the AEC will calculate a necessary correction to add to the estimated dose during the exposure. This procedure takes a while, and for very thin objects it is possible that the AEC will not manage to decide within the time limit whether a correction is necessary. This will result in an error, due to small object thickness.

Fault elimination

Acknowledge displayed error. Change exposure parameters (e.g. lower kV).

Err 414

"Attempt to release an exposure after the PLD in the AEC has failed self-test/configuration"

Description

Caused by previously generated errors 401, 402, 403, 409 and not restarted MAMMOMAT Novation^{DR}.

Fault elimination

Switch off the MAMMOMAT Novation^{DR}. Wait approx. one minute. Start up the MAMMOMAT Novation^{DR}. If the error recurs, replace the D750 circuit board.

Err 416

“Estimated dose out of range”

Description

The estimated dose is out of range, which can be caused by

- extreme setting of sensitivity
- extreme setting of sensitivity correction
- extreme setting of density correction.

This means that the exposure will be eliminated by the max. mAs limit.

Fault elimination

Acknowledge displayed error. Make sure the correct AEC correction tables are installed. Check settings of sensitivity, sensitivity correction and density correction.

Err 418

“Attempt to perform offset compensation test while in AEC mode”

Description

During an offset compensation test, the AEC board is set to a special test mode and cannot perform an AEC exposure. Because of this, the test exposures have to be performed in mAs mode during this test.

Fault elimination

Acknowledge displayed error. Change to mAs and follow the instructions for offset compensation test.

Err 419

“Attempt to write to registers of PLD not available during exposure”

Description

This is an internal error that does not interfere with an exposure and is not shown on the control panel.

Fault elimination

If this error is discovered during reading of the error buffer by the service PC, please report it immediately.

Err 420

“Dose or time monitor overflow in PLD”

Description

This is an internal error that does not interfere with an exposure and is not shown on the control panel. Time and dose values reported by the service PC are not valid.

Fault elimination

If this error is discovered during reading of the error buffer by the service PC, please report it immediately.

Err 421

“Wrong test mode request received by PLD”

Description

This is an internal error that does not interfere with an exposure and is not shown on the control panel.

Fault elimination

If this error is discovered during reading of the error buffer by the service PC, please report it immediately.

Err 422

“Attempt to read registers of PLD not available during exposure”

Description

This is an internal error that does not interfere with an exposure and is not shown on the control panel.

Fault elimination

If this error is discovered during reading of the error buffer by the service PC, please report it immediately.

Err 423

“Counters for estimated doses in PLD not initialized in time”

Description

If mAs mode: Internal error that does not interfere with an exposure and is not shown on the control panel. If AEC mode: Internal error that interferes with an exposure and is shown on the control panel.

Fault elimination

If mAs mode: If this error is discovered during reading of the error buffer by the service PC, please report it immediately.

If AEC mode: Acknowledge displayed error. Wait 15 seconds. Try to perform an exposure.

Err 450

“Exposure aborted by dose monitoring”

Description

An AEC exposure could not be performed due to unsufficient detected dose rate.

Fault elimination

Acknowledge displayed error. Change exposure parameter settings (e.g. higher kV).

Error messages of the AEC Err 5XX

Err 501

“DR detector requests interruption of tube voltage”

Description

The HW signal DR_DET_RDY_FOR_EXP has become inactive during the exposure.

Fault elimination

Check the plugs and connections at board D750.

Err 502

“DR system requests interruption of tube voltage”

Description

The HW signal DR_SYST_RDY has become inactive during the exposure.

Fault elimination

Check the plugs and connections at board D750.

Err 503

“Master does not sense DR signal level change within specified times”

Description

At exposure start, the HW signal DR_DET_RDY_FOR_EXP is not activated within the specified time.

Fault elimination

Check the plugs and connections at board D750.

Err 504

“Master senses an error within the DR system”

Description

The HW signal DR_DET_ERR has been activated.

Fault elimination

Check the plugs and connections at board D750.

Err 506

“Master senses a tube arc during the AEC pre-exposure when in DR mode”

Description

A tube arc has occurred during the AEC pre-exposure. No tube arc is allowed during the AEC pre-exposure.

Fault elimination

N.a.

Err 578

“mAs exceeds maximum”

Description

The calculated AEC main exposure mAs value returned by the DR system exceeds the maximum mAs value that the MAMMOMAT Novation^{DR} can handle.

Fault elimination

Check AEC function.

Err 579

“Master is not updated with the mAs value for the main exposure in AEC mode”

Description

The mAs value for the main exposure was not calculated/transmitted by the DR system or received by the MAMMOMAT Novation^{DR} within the specified time.

Fault elimination

Check the plugs and connections at board D750.

Error messages of the power pack Err 6XX

Err 601

“Rotation speed not reached within 3s”

Description

During starting of the rotating anode, the master counts the control pulses and compares them to a ‘tube assembly and intermediate circuit voltage’-dependent table value. If this is not reached within 3 s, Err 601 is displayed.

Fault elimination

Check oscillation current (see wiring diagram).

Rotating anode cable or stator defective.

Err 602

“kV_{min} - minimum tube voltage 17 kV not reached”

Displayed on PC: kV_{min}-minimum tube voltage 17kV not reached

Description

If 17 kV is not reached within 250 ms after the KVE signal, the above error message is displayed.

Fault elimination

Intermediate circuit voltage too low (see wiring diagram).

Tube current or power too high.

Check oscillation current (see wiring diagram).

SS relay not pulled up (see wiring diagram).

“kV_{nom}” too low.

Board D750 defective.

Err 603

“kV_{max} - tube voltage greater than 50 kV”

Description

During exposure, a threshold switch in the kV controller monitors whether the high voltage exceeds 50 kV. If this is the case, the exposure is aborted immediately via the KVA lead.

Fault elimination

Check kV nominal value. Check tube current and power. Actual value acquisition defective (see wiring diagram). Replace PC board D750.

Err 604

“WR blank out - inverter short circuit blanking signal remains”

Description

When I_{max} in the inverter is exceeded, the control is interrupted for 200 ms. The software then checks whether the blanking signal is still applied. If this is the case, the above error message is displayed.

Fault elimination

Transistor module in HV inverter defective. Check fuses.

Stator short circuit.

Board D750 defective.

Err 606

"Inverter short circuit during radiation"

Description

Tube overcurrent during exposure sequence.

Fault elimination

Transistor module in HV inverter defective. Check fuses.

Stator short circuit.

Board D750 defective.

Err 607

"Inverter short circuit during brake cycle"

Description

Actual tube voltage deviates by more than 5% from nominal at the start of the exposure.

Fault elimination

Transistor module in HV inverter defective. Check fuses.

Stator short circuit.

Err 608

"Tube current is outside limits"

Description

Actual tube current deviates by more than 10% from nominal at the start of the exposure.

Fault elimination

Transistor module in HV inverter defective. Check fuses.

Stator short circuit.

Err 611

"KVA signal disabled during radiation"

Description

During exposure, KVA becomes "H" and the inverter is thus enabled. If this enabling fails, the above error message is displayed.

Fault elimination

Check KVA lead (see wiring diagram).

Board D750 defective.

Err 620

"U_{anst} +15V to control inverter not present"

Displayed on PC: U_{anst} +15V to control inverter not present

Description

The DC bus voltage used for powering the modules of the generator assembly is too low or too high.

Fault elimination

Check the power supply and fuses.

Err 630

"PH1 pressure switch on the HV tank activated"

Description

HV actual value does not correspond to the HV set value. The above error message is displayed.

Fault elimination

Overload of the tube assembly or of HV inverter.

Line interruption (see wiring diagram).

Board D750 defective (monitoring).

Err 631

"Open connector in the generator"

Description

At least one connector between modules of the generator assembly or between the master board and the modules of the generator assembly is not connected.

Fault elimination

Line interruption (see wiring diagram).

Board D750 defective (monitoring).

Err 632

"Bias voltage error"

Description

Active bias voltage for large focus or inactive bias voltage for small focus.

Fault elimination

Check power supplies and fuses on D750.

Err 633

“The high voltage is detected during standby”

Description

If any or both of the signals HV_ON and EN_HV_ON are active during standby (no exposure being performed), this error is issued. Is displayed when the tube is arcing.

Fault elimination

Press the "Lim" button to clear the error message.

Check the HV inverter module.

Err 634

“Voltage outside limits for 15V supplies”

Description

This error is issued if the +15V supply voltage goes below 10.6V or if the -15V supply voltage goes above -10.75V.

Fault elimination

Check the power supplies at the mains converter module and fuses.

Error messages of the OPDIMA Err 7XX

Err 777

“Exposure sequence is aborted by OPDIMA”

Description

The time between pressing acquire from the workstation and releasing the exposure from the MAMMOMAT generator has exceeded 60 seconds.

The selected exposure parameters (kV, mAs) will yield an excessively hard beam quality for the object.

The cancel button was pressed while "Expose at MAMMOMAT" or "Exposure preparation started" was displayed.

Fault elimination

Press the limit button on the MAMMOMAT generator control panel to continue.

Err 778

“No communication present between MAMMOMAT and OPDIMA”

Description

Communication problem.

Fault elimination

Press "Retry" from the workstation or press the limit button on the MAMMOMAT generator control panel to continue. Check the plugs and cables.

Err 779

“The mAs value for main exposure in OPDIMA AEC mode was not received in time”

Description

Communication problem.

Fault elimination

Press the limit button on the MAMMOMAT generator control panel to continue.

Error messages of the stand Err 8XX

Err 801

“Timeout of AR signal”

Description

The grid did not reached its start position within 2 seconds.

Fault elimination

Board D750 defective.

Check grid functioning.

Err 802

“OKT 2 pressure switch on tube housing or beam form anode or door switch”

Description

The oil pressure in the tube has exceeded the limit.

Fault elimination

Let the tube cool down. Close door/switches

Err 803

“Stand requests interruption of tube voltage”

Description

The processor on stand CPU board D801 requests termination of high voltage generation.

Fault elimination

Switch off the equipment and then switch it on again.

Err 811

“Stand not ready for exposure”

Description

Normally, the panel does not allow start of exposure if any of the following errors are present: No object table installed, no film cassette inserted, or film cassette not changed after exposure, improper diaphragm mounted. Nor will it allow exposure if the tube assembly is at a distance from the floor that could result in collision. These operator errors are indicated on the control panel (the LED at the corresponding symbol lights up). Should the control panel nevertheless allow start of exposure, this might be due to a bit error during the transmission of data between the stand and the control panel. As a precautionary measure, the stand also checks whether the conditions are fulfilled. If this is not the case, error message 811 will be generated.

Fault elimination

Switch off the equipment and then switch it on again.

Err 812

“Compression protect switch not OK in stand”

Description

This signal is used to check for proper operation of the compression protect relay (Kl) on the motor board (D802). The CPU (D801) reads the signal after a short delay after releasing the compression pedal in order to check that the relay has opened and disabled motor running in the compression direction. Note that the test point on D802 is protected with 4.75k.

Fault elimination, troubleshooting

Check the fuses on board D802. Normal active level is 9V (test point COMP_PROT on D802). If the level is OV check 14V and Kl on the motor board or look for a shortcircuit on the ribbon cable between D801 and D802. If the cable is OK, D802 should be replaced.

If the voltage is 18V on the test point, the ribbon cable is open or D801 is faulty.

If the voltage is OK, replace D801.

Err 813

“Compression motor controller, or motor, error in stand”

Description

This signal indicates an overcurrent or lack of voltage (5V or 15V) in the compression motor drive. In the case of an overcurrent, the signal appears after about 2 s and disappears after about 0.5 s. The signal causes D801 to stop sending pulses to the compression drive and thus disables the compression motor. The red LED “comp error”, V2 lights in the case of an error (comp_ok signal low) except if 5V is missing.There is no test point.

Fault elimination, troubleshooting

If V2 is lit steadily, check fuses F3 (24V) and F2 (24VF & l5V). l5V is indicated by LED V49 and can be measured at test point l5V on D802. Test point 24VF should measure about 30V unloaded. 5V is indicated by LED V7 and test point 5V on D802. If 5V and 14V (normally about 18V unloaded) are missing, check Fl on D801. Missing voltages can also be caused by an open connection in the emergency stop switch S880.

Overcurrent is most likely caused by a faulty motor, mechanical overloading of motorized movement, short-circuited wiring of D805 or faulty D802.

Err 815

“Compression speed too high, error suspected in stand”

Description

The CPU (D801) detected a compression speed greater than 13 cm/s. The software causes the compression motor to reverse direction.

Fault elimination, troubleshooting

This error can be caused by play in the compression unit, defective compression measurement hardware, or a short-circuited power stage on the motor board. In the first two cases, replace the compression unit and re-calibrate the compression values with the service PC program. In the third case, the compression motor will run at max. speed upwards except when a compression pedal is pressed. It is not certain that error 815 will appear. Replace D802.

Err 816

“Collimator fails to reach correct position in time”

Description

Timeout for filter lamella positioning.

Fault elimination, troubleshooting

Check whether the collimator plate moves at all.

If it does not move:

- Check whether the CPU sends out pulses, COLL_ST test point on D801, if not, replace D801.
- Check whether the wing board (D805) receives pulses, test point COLL_ST on D805, if not, check cables and connectors between D801 and D805.
- Check voltages on wing board.
- Check STEP_ENABLE test point on D805, it should be low (0V) when pulses are output to the motor

If it moves:

- Check whether the collimator position light switch works as in the description above
- Check whether it moves for the entire 8 s. If it does but apparently does not reach the other position in time, something may be in the way and slowing the speed down, or the motor may be faulty. In the latter case, try replacing the motor.
- If the motor stops after just a short time, either the motor or the wing board (D805) is faulty. Try replacing one of them.

Err 817

“Filter self-test failure”

Description

Zero position for filter wheel is not found during start-up.

Fault elimination, troubleshooting

Switch between the three anode/filter combinations on the control panel and check if the filter disc moves at all.

- Check whether the filter position light switch works.
- If it moves slowly, then something may be in the way and slowing the speed down, or the motor may be faulty. In the latter case, try replacing the motor.
- If the motor stops after just a short time, either the motor or the wing board (D805) is faulty. Try replacing one of them.

Err 818

“Filter positioning failure”

Description

Zero position for filter wheel is not found after exposure.

Fault elimination

Switch between the three anode/filter combinations on the control panel and check if the filter disc moves at all.

- Check whether the filter position light switch works.
- If it moves slowly, then something may be in the way and slowing the speed down, or the motor may be faulty. In the latter case, try replacing the motor.
- If the motor stops after just a short time, either the motor or the wing board (D805) is faulty. Try replacing one of them.

Err 819

“Drive protect switch not OK (lift and rotation) in stand”

Description

This signal is used to check for proper operation of the drive protect relay (K6) on the motor board (D802). The CPU (D801) reads the signal after a short delay after releasing the activated lift or rotation button in order to check that the relay has opened and disabled motor running.

Fault elimination, troubleshooting

Normal active level is 5V (test point DRIVE_PROT on D802). If the level is 0V, check 24VF and K3 on the motor board or look for a short circuit on the ribbon cable between D801 and D802. If the cable is OK, D802 should be replaced.

If the voltage is 30V on the test point, the ribbon cable is open or D801 is faulty.

If the voltage is OK, replace D801.

NOTE

There is no corresponding error for the lift & rotation drive to compression OK error. If this fault occurs, D801 stops sending pulses to D802 and the selected motor stops. The LED V12, DRIVE_ERROR functions in the same manner as COMP_ERROR. Note that the current limit is lower when the lift motor is moving in a downward direction. If the lift or rotation operation indicates an overload, look at the DRIVE_ERROR LED to determine if the motor is overloaded.

Overloading is possible due to improper balancing (adjustment of the spring or improper loading of the lifting carriage) or improper adjustment of the rotation brake. Faulty motor, short-circuited wiring or faulty D802 are other possible causes.

Err 820

“Write/read back failure with EEPROM in stand”

Description

If data is stored in the stand E^2PROM (D801.I34) during adjustment, a check is performed to verify whether they have been correctly stored. Should differences occur, the above error message is displayed.

Fault elimination

Repeat the attempt to write in the E^2PROM. If this does not yield any results, in spite of repeated attempts, board D801 must be replaced. All stand parameters must be reinstalled. Use the service PC to reinstall the stand parameters from floppy or disk.

Err 821

"Stand EEPROM has wrong version nbr (=old or corrupt)"

Description

The version number of the stand PROM is also stored in the E^2PROM (D801.I34). When starting up the equipment, the version number stored in the E^2PROM is compared to the version number of the PROM. If they do not correspond, the above error message code is displayed on the control panel. This occurs after changing the software version, to indicate that a new version has been installed.

Fault elimination

The version number of the new software is automatically written into the E^2PROM. Switch off the equipment and then switch it on again. The error should recur.

Err 822

"Grid failed to move properly"

Description

The grid must move properly from the start. This is supervised by the CPU. The CPU measures the time from the start until the grid has reached one of the end positions and then is able to leave it. To check that the grid in functioning properly and does not jam, the time the grid requires to move between the two end positions is also measured the first time. If the time for the start or run check exceeds 2 sec., this error will appear.

Fault elimination, troubleshooting

Check programming of grid fast speed (normally 80%) and grid fast speed time (normally 500 ms).

Check the bucky board, first try another board. Make sure the grid moves freely through its whole travel in both directions.

Check the output voltage at test point GRID_M on D802. At 80% speed and nominally 30V on 24VF, GRID_M should be 30 - 0.8*30 = 6V during fast grid movement. Check for possible short circuits if the signal remains approx. 30V. This voltage goes to the bucky via board D805 and its relay Kl. Test point GRID_SP on D802 is the control signal from D801. It is a 5V, 20 kHz PWM signal. At 80% speed, the signal should be low, approx. 40 µs and high, approx. 10 µs per period. Replace D802 if the correct output is not achieved despite proper input, cabling and bucky.

Err 824

"Stand motor voltage drops unnaturally"

Description

The CPU (D801) measures voltage 24VF from the motor board (D802). If this value is below approx. 16V, this error is reported.

Fault elimination, troubleshooting

Check that the stand has voltage (generator - X14 connected, F4 OK). The stand display should be on.

Check that the emergency stop is not activated and that its wiring is OK.

Check that LED V49, 15V, is lit. If not, check fuses F2 and F3 on D802 in the stand.

Check voltage 24VF (measure with reference to test point 0V on D802).

Check the ribbon cable between D802 and D801.

Replace D801.

Err 825

“One or more potentiometer seems to have lost contact with stand”

Description

The four potentiometers, R803 tube angle, R871 preset angle, R861 preset force and R863 thickness, have their return current through signal pot_return. This is done to ensure that no pot. is missing or partly disconnected so that it may give a value leading to improper operation of the stand. During stand configuration or after replacing a potentiometer or the compression unit, the correct value for the signal potentiometer check must be read and stored in the stand’s E^2PROM with the service PC program. This error is reported if the measured value is more than 32 bits less than the programmed value.

Fault elimination, troubleshooting

Check that all pots are functioning properly. An error can be caused by an open connection, connector or pot. If all four pots are functioning properly, check the programming of the pot check and correct it. The need for such an adjustment may indicate a pot about to fail.

Err 826

“There is a short circuit somewhere between the potentiometers in stand”

Description

The same circuitry as Err 825 is used. In this case the error indicates that the value is more than 32 bits greater than the programmed value.

Fault elimination, troubleshooting

Check the actual and programmed pot check values with the service PC program. If the value is only slightly too high, check all pots for mechanical damage or sensitivity. A short circuit (pot or wiring) should result in the max. value for pot_check (3FF).

Err 829

“Collimator motor communication error”

Description

Communication between the stand and collimator control board D814 is erroneous or disrupted.

Fault elimination, troubleshooting

Check cables and plugs. Replace D814.

Err 830

“Filter motor communication error”

Description

Communication between the stand and collimator control board D814 is erroneous or disrupted.

Fault elimination, troubleshooting

Check cables and plugs. Replace D814.

Err 831

“Paddle decoder communication error”

Description

Identification of compression paddle fails.

Fault elimination, troubleshooting

Clean the sensor at paddle. Check whether the paddle code is working with another paddle.

Err 850

“Write/read back failure for table 1 in stand EEPROM”

Description

Each time the MAMMOMAT Novation^{DR} is switched on, the adjustment data in the stand EEPROM (D801.I34) is checked with a checksum. Each menu under “Stand config” has its own checksum. If a discrepancy is detected in the stand installation menu, the above error message is displayed.

Fault elimination

Install all stand parameters using the service PC “backup” menu.

Err 851

“Write/read back failure for table 2 in stand EEPROM”

Description

Each time the MAMMOMAT Novation^{DR} is switched on, the adjustment data in the stand EEPROM (D801.I34) is checked with a checksum. Each menu under “Stand config” has its own checksum. If a discrepancy is detected in the calibrate compression menu, the above error message is displayed.

Fault elimination

Install all stand parameters using the service PC “backup” menu.

Err 852

“Write/read back failure for table 3 in stand EEPROM”

Description

Each time the MAMMOMAT Novation^{DR} is switched on, the adjustment data in the stand EEPROM (D801.I34) is checked with a checksum. Each menu under “Stand config” has its own checksum. If a discrepancy is detected in the rotation calibration menu, the above error message is displayed.

Fault elimination

Install all stand parameters using the service PC “backup” menu.

Err 853

“Write/read back failure for table 4 in stand EEPROM”

Description

Each time the MAMMOMAT Novation^{DR} is switched on, the adjustment data in the stand EEPROM (D801.I34) is checked with a checksum. Each menu under “Stand config” has its own checksum. If a discrepancy is detected in the rotation calibration menu, the above error message is displayed.

Fault elimination

Install all stand parameters using the service PC “backup” menu.

Err 854

“Write/read back failure for table 5 in stand EEPROM”

Description

Each time the MAMMOMAT Novation^{DR} is switched on, the adjustment data in the stand EEPROM (D801.I34) is checked with a checksum. Each menu under “Stand config” has its own checksum. If a discrepancy is detected in the lift parameters menu, the above error message is displayed.

Fault elimination

Install all stand parameters using the service PC “backup” menu.

Err 855

“Write/read back failure for table 6 in stand EEPROM”

Description

Each time the MAMMOMAT Novation^{DR} is switched on, the adjustment data in the stand EEPROM (D801.I34) is checked with a checksum. Each menu under “Stand config” has its own checksum. If a discrepancy is detected in the best compression menu, the above error message is displayed.

Fault elimination

Install all stand parameters using the service PC “backup” menu.

Err 856

“Write/read back failure for table 7 in stand EEPROM”

Description

Each time the MAMMOMAT Novation^{DR} is switched on, the adjustment data in the stand EEPROM (D801.I34) is checked with a checksum. Each menu under “Stand config” has its own checksum. If a discrepancy is detected in the rotation parameters menu, the above error message is displayed.

Fault elimination

Install all stand parameters using the service PC “backup” menu.

Err 857

“Write/read back failure for table 8 in stand EEPROM”

Description

Each time the MAMMOMAT Novation^{DR} is switched on, the adjustment data in the stand EEPROM (D801.I34) is checked with a checksum. Each menu under “Stand config” has its own checksum. If a discrepancy is detected in the beam limiting device menu, the above error message is displayed.

Fault elimination

Install all stand parameters using the service PC “backup” menu.

Err 858

“Write/read back failure for table 9 in stand EEPROM”

Description

Each time the MAMMOMAT Novation^{DR} is switched on, the adjustment data in the stand EEPROM (D801.I34) is checked with a checksum. Each menu under “Stand config” has its own checksum. If a discrepancy is detected in the rotation parameters menu, the above error message is displayed.

Fault elimination

Install all stand parameters using the service PC “backup” menu.

Err 859

“**Write/read back failure for table 10 in stand EEPROM”**

Description

Each time the MAMMOMAT Novation^{DR} is switched on, the adjustment data in the stand EEPROM (D801.I34) is checked with a checksum. Each menu under “Stand config” has its own checksum. If a discrepancy is detected in the rotation calibration menu, the above error message is displayed.

Fault elimination

Install all stand parameters using the service PC “backup” menu.

Err 860

“Write/read back failure for table 11 in stand EEPROM”

Description

Incorrect checksum for collimator calibration parameters for small focus Mo in EEPROM.

Fault elimination

Install all stand parameters using the service PC “backup” menu.

Err 861

“Write/read back failure for table 12 in stand EEPROM”

Description

Incorrect checksum for collimator calibration parameters for large focus Mo in EEPROM.

Fault elimination

Install all stand parameters using the service PC “backup” menu.

Err 862

“Write/read back failure for table 13 in stand EEPROM”

Description

Incorrect checksum for collimator calibration parameters for small focus W in EEPROM.

Fault elimination

Install all stand parameters using the service PC “backup” menu.

Err 863

“Write/read back failure for table 14 in stand EEPROM”

Description

Incorrect checksum for collimator calibration parameters for large focus W in EEPROM.

Fault elimination

Install all stand parameters using the service PC “backup” menu.

Err 864

“Write/read back failure for table 15 in stand EEPROM”

Description

Incorrect checksum for collimator calibration parameters for the light field focus in EEPROM.

Fault elimination

Install all stand parameters using the service PC “backup” menu.

Err 865

“Write/read back failure for table 16 in stand EEPROM”

Description

Incorrect checksum for the calibration parameters for wing differences in EEPROM.

Fault elimination

Install all stand parameters using the service PC “backup” menu.

Err 866

“Write/read back failure for table 17 in stand EEPROM”

Description

Incorrect checksum for the calibration parameters for the filter in EEPROM.

Fault elimination

Install all stand parameters using the service PC “backup” menu.

Err 867

“Write/read back failure for table 18 in stand EEPROM”

Description

Incorrect checksum for the calibration parameters for the optimum compression function in EEPROM.

Fault elimination

Install all stand parameters using the service PC “backup” menu.

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Adjustment and Service PC Programs	29	Grid speed: Default values Screen with default values